No. 1779
Vol. XLIII

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FLIGHT and The AIRCRAFT ENGINEER

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The Outlook

Blowing the Trumpet

"THE air striking force in the Middle East has pointed the way to the future of the Royal Air Force."

This prophetic sentence was uttered by Air Chief Marshal Sir Arthur Tedder (so it is reported) in an interview before he made over the Middle East Command to Sir Sholto Douglas. It also occurs in an official statement issued shortly afterwards in Cairo. The speech and the statement have a curious relationship, for some passages in both are identical, while others are not. Other sentences which occur in both are: "The command of the air determines what happens on land and on sea, whereas armies and navies cannot affect the command of the air. Air supremacy will win the war."

After the magnificent achievements of the Middle East air squadrons one can understand the staff of the Command and the A.O.C.-in-C. feeling somewhat exuberant, but even so it was not fitting for them to set forth principles with which, we understand, the Air Staff in Whitehall does not agree. The authoritative view, we believe, is that the air war is a struggle in a different element from that of the Army and the Navy, but it is not a separate war and it does not follow a separate line of strategy. It is obvious, also, that what happens on land and on the sea can and does affect the command of the air. Air power depends on bases, as do other forms of power, and an army must capture and hold air bases before aircraft can use them. This has been abundantly illustrated in the to-and-fro campaigns in Libya.

Likewise, it is an exaggeration, and one to be strongly deprecated, to say that "air supremacy will win the war." The history of General Ritchie's advance and subsequent defeat, in spite of his air supremacy, proves that point. It is obviously a fact that the war cannot be won without a high degree of air superiority (air supremacy would be even better), but that is true of other arms besides the air arm. The war cannot be won, for instance, without superiority of fire on the ground and on the sea.

The sentence with which this article opens is perhaps a true prophecy. The Air Force in the Middle East, by a process of trial and error, finally arrived at the ideal, or something approaching the ideal, in the way of co-operating with the Army. It did not reach this point, however, until Mr. Churchill had laid it down that it was for the Army Commander to say what he wanted, and for the A.O.C.-in-C. to carry out that policy with his utmost power.

Of course, air operations took place over sea as well as over land, and Sir Arthur Tedder was quite justified in pointing out that damage to Rommel's supplies by air action benefited the soldiers fighting in the desert. It is not known yet whether the R.A.F. or naval aircraft or naval vessels sank most of the Axis supply ships; but probably where warships did the killing they often acted on reports by reconnaissance aircraft, which deserve a share of the credit. The most complete destruction of an enemy convoy occurred when British cruisers intercepted one. It would be very wrong to under-estimate naval power, and fire from cruisers must be more potent (when the enemy is within range) than any attack from the air can be.

When an Air Force Command has performed wonders it is a thousand pities to exaggerate its already sufficiently high importance. The claims made by some ill-chosen words of Sir Arthur Tedder and his staff at Cairo may mislead some of the public, and cannot be allowed to pass without correction. The essential of victory is a well-balanced force of all necessary arms.

Where Were the Balloons?

ONE feature of the day raid on the London area on Wednesday last week was the low flying and machine-gunning by the raiders in a number of places. Even during the height of the Battle of Britain the London area was immune from such attacks, thanks to the dread with which the cables inspired the German pilots. Yet last week several cases were reported in which the fighter-bombers flew low and machine-gunned people in the streets. The Germans themselves said in their official announcement that the barrage balloons only went up at the beginning of the raid.

The loss of a few balloons does not matter, but it does matter that the cables should not give the people of London the protection from low flying and machine-gunning which is the whole object of the barrage. The Balloon Command works under the orders of Fighter Command, and if there is a case for blame, as there seems to be, the responsibility must rest on Fighter Command. The crews which work the balloons only obey orders from above, and cannot be held responsible. An official investigation certainly seems to be required, and Parliament is rightly interesting itself in the matter.

Naval Air Services

WHEN Rear-Admiral (now Vice-Admiral) Lyster was Fifth Sea Lord, before he was given command of carriers in the Anglo-American expedition to French Africa, he was also Chief of Naval Air Services. A reorganisation has now taken place at the Admiralty (see page 88), which should make for improvement in the Fleet Air Arm.

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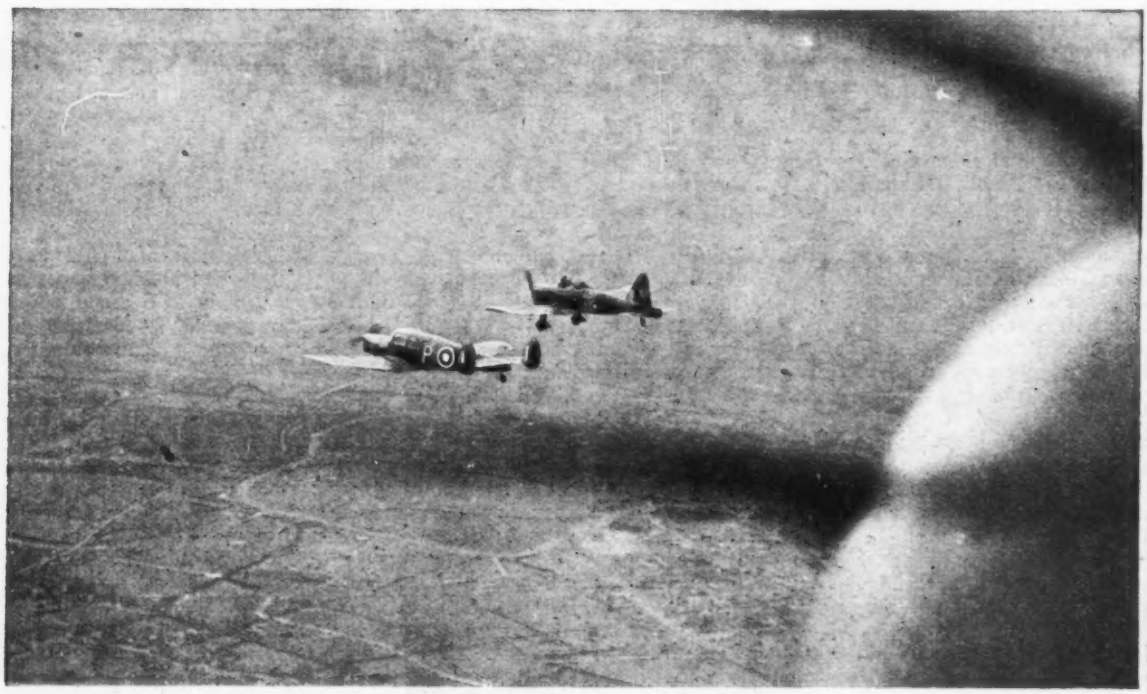
The interests of the air side of the Royal Navy should certainly be better cared for under this new arrangement, and it is particularly welcome to know that the Fifth Sea Lord will have equipment as his special care. The Fleet Air Arm has done wonders in this war with the equipment provided for it, but it has been the general belief that this has not been as suitable as it ought to have been. The pilots, observers, and, in fact, all the personnel, have been splendid, but few of the types of aircraft provided have been specially designed for working from carriers, and some which were so designed have not given universal satisfaction. Adaptations of shore-based types have given good service, but it surely should be possible for something better to be produced.



TWO MORE MILES : All operational and training aircraft are flown by pilots of the Empire Central Flying Schools in order that their flying characteristics may be assessed and passed on to those who have to fly them. Training machines get particular attention, and above is shown the prototype Miles M 28 and the Miles 18.

The M 28 (nearest the camera) is a cabin monoplane designed to fulfil two functions. One version is a two-seater ab initio intermediate trainer and the other a four-seater communications aircraft. Both models have exceptionally large windscreens and are fitted with low-drag auxiliary aerofoil flaps combined with fuselage air brakes and drooping ailerons. The undercarriage is retractable. For power there is a wide choice of engines. The Gipsy Major IC, II, III and Cirrus Major are all suitable. The M 18 is a Magister replacement ; the most obvious modification is to the fin and rudder which have been completely redesigned. It has a Cirrus Major engine.

INCENSED NIPPONESE : Smoke rising from two Japanese ships which have been dive-bombed at Tassafaronga, on Guadalcanal. The machine is a Douglas Dauntless.

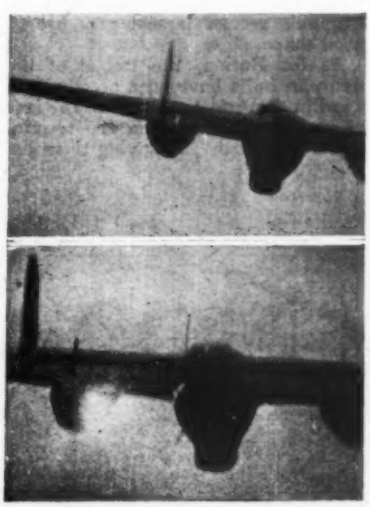
WAR in the AIR

Allied Help to Russia : The Pursuit of Rommel : Weak, but Vicious Raids on Britain : Army-Air Co-operation in Burma

THE glorious successes of the Russians have continued since the last issue of *Flight* was published, and the relief of Leningrad, following on the encirclement of the German Sixth Army round Stalingrad, must have been one of the bitterest pills which Hitler has ever had to swallow—not that the medicine administered by Generals Alexander and Montgomery has been over-sweet. Still further doses seem likely to be poured out in Russia before long.

Aircraft Sent to Russia

IT is very gratifying to think that British factories have played no small part in these Russian victories. Mr. Stettinus, the United States Lend-Lease administrator, recently stated that up to January 1st the factories in the United States and the United Kingdom between them had shipped over 4,600 aircraft to Russia, in addition to other war material. That contribution must have made a difference even to that country of vast distances and enormous battles. There appears to be plenty of evidence that the double offensive in Africa has also brought relief to the Russians by diverting aircraft of all classes to the southern shores of the Mediterranean. It is probable that von Hoth's Sixth Army at Stalingrad might be in much better case if every Ju 52 in Germany's possession had been available for sending food and ammunition to it. As things have gone, many of the transport machines have had to be used on the ferry service to Tunisia—where a respectable proportion of them has been shot down.



END OF A DORNIER : Fighter pilot's view through his sights as the enemy comes into point-blank range and his stream of cannon shells sets the port engine on fire

Air Power in Africa

THE efforts made by the Germans to improve their position in southern Tunisia against the French troops indicate their anxiety that the remnants of Rommel's forces should be able to find a refuge there, and assist in the defence of that area. The French have as yet practically no aircraft, and British and American squadrons have had to go to their help. The Americans have undertaken to equip Gen. Giraud's men adequately as soon as the aircraft and other weapons can be brought across.

In the meantime Rommel continued his withdrawal from his temporary halts at various *wadis*, and skilfully prevented the British Eighth Army from surrounding him and bringing off a decisive battle. As he drew near to Tripoli, the *Luftwaffe*

WAR IN THE AIR

gave him a certain amount of help, but it did not amount to much. Tripoli's airfield at Castel Benito was heavily bombed by both British and American forces, and many aircraft were certainly destroyed on the ground. In any case, nothing checked the persistence with which the Allied fighter-bombers with the Eighth Army kept up their pursuit of the retreating Axis columns, and the destruction of vehicles and troops on the road continued unabated. The mobility displayed by Air Marshal Coningham's squadrons has been one of the surprises of the war. For air bases to keep pace with a rapidly advancing army has always been thought to be out of the question, but in Tripolitania the unexpected has been accomplished. Royal Engineers have done great work in clearing up the landing grounds evacuated by the German and Italian squadrons (another instance of the close co-operation of the two Services in that campaign), while it has also been a pleasant surprise to learn of the amount of air transport which has been available to keep the Eighth Army and its air squadrons supplied from the base. Most of the transport machines are American, but there are also some Bristol Bombays in use.

The Typhoon Fighter

ON the Western Front official mention has at last been made of the Hawker Typhoon fighter, which has been in action there for some time—in fact, a Wing of squadrons equipped with Typhoons was in action at Dieppe. This machine is dealt with fully on other pages of this issue.

Ever since the R.A.F. made its recent raids on Berlin the *Luftwaffe* in France has indulged in a series of small-scale raids by day and night which have had London as their objective. On one raid there were few, if any, balloons up, and so they were able to fly low and machine-gun streets. They did not penetrate to the central parts of the Capital, but one bomb which hit a school caused a most lamentable number of deaths and injuries among children and staff. The scale of these raids indicates that the *Luftwaffe* is not in strength in Northern France.

FOUR IN A NIGHT: Wing Cdr. C. M. Wight-Boycott, commanding a night fighter squadron, and his observer, F/O. A. M. Sanders (left), who shot down four enemy bombers (three Dorniers and a Ju 88) during the raid on London on the night of January 17th-18th.

R.A.F. and American raids by light bombers and fighters over adjacent parts of the Continent have been incessant, most of them aimed at the enemy's communications.

Another part of the Empire which had been raided on a scale which seems ridiculous is Calcutta. There have been seven raids there in two months, but the Japanese have sent very few machines over, and they have only carried very light bombs. British and Australian night-fighters have destroyed most of the raiders, which proves that the defences of the Empire's second largest city are in good shape.

As for Burma, the troops of the Army in India have been pressing forward in the Arakan district in the face of great difficulties from the terrain. The R.A.F. has been giving them excellent close support, and battalions in difficulties have been able to summon air assistance, which has arrived very promptly. On one occasion our soldiers were still advancing up a hillside while R.A.F. machines attacked the Japanese as they retreated hurriedly down the reverse slope. A senior officer who arrived there from the Middle East has said that the Army-air co-operation in Burma was, if anything, closer than in Africa.

As for the Pacific, General MacArthur uses his air forces there for all they are worth. In the closing stages of the fighting for Sananda the Australian infantry had to do most of the work, but they were immensely helped by the fire of Australian artillery and the work of American bombers. General MacArthur's heavy machines continue to attack Japanese naval units, transports, and troops wherever they can find them—on the seas and in the harbours of the innumerable islands which the Japanese have occupied.

Last week American Fortresses scored a bomb hit on a Japanese

OUT FOR THE DURATION: Eleven Airacobras of the U.S. Air Force which landed at Lisbon owing to fuel shortage. The Portugese impounded the machines and interned the pilots.

WAR IN THE AIR

ENEMY AIR LOSSES TO JAN. 23rd.

	Over G.B.	Over Continent	Middle East
Jan. 17	11	6	4
,, 18	0	0	0
,, 19	0	0	4
,, 20	16	1	0
,, 21	1	3	6
,, 22	1	4	3
,, 23	0	0	0
	29	14	17

Totals : West, 6,584 ; Middle East, over 5,205.

destroyer off Cape Friendship, at the easternmost tip of Bougainville Island. Japanese fighters have not been inactive, and sometimes they succeed in inflicting damage even on Fortresses, but they always suffer more losses than they are able to inflict.

When the last post of the Japanese at Sanananda had been wiped out, thereby finishing the campaign in the Papua region of New Guinea, General MacArthur said that the outstanding lesson of the campaign had been "the continuous and calculated application of air power, employed in the most intimate and logistical union with ground troops." Air forces and ground forces, he said, had been welded together in Papua, and, "when in sufficient strength and with proper naval support, their indissoluble union pointed the way to victory through new and broadened strategic and tactical conceptions."

Tripoli Fallen

IT was in 1911 that the Italians captured Tripoli from the Turks. As the latter had no fleet to speak of, it was an easy conquest. On the day that the Italian ships entered the harbour an aircraft flew over the town for the first time, to the great amazement of the inhabitants. Now they are probably glad that Italian machines may try to bomb them; at least, it means that the R.A.F. will do so no more. So ends Italy's Empire in Africa.

Rommel, it must be admitted, has achieved his object of getting through into Tunisia. At what stage it was decided that he should not attempt to hold Tripolitania is not certain. Possibly the decision was taken when his hopes of conquering Egypt disappeared, while at the same time the Allies landed in French Africa. To pursue an aim unswervingly is a principle of strategy, and to achieve that aim is usually considered a triumph. But the degree of success must always be balanced against the price paid for it, and Rommel has paid a very heavy price in his long retreat. The R.A.F. has seen to that.

The question is whether the Axis forces which Rommel has succeeded in getting into Tunisia are sufficient in number to justify the effort he has made. Will his contribution to the Axis troops already there make a total which will cause serious embarrassment to the Allies? Or should we conclude that Rommel had no choice in the matter, and believed that a stand at any one of the defensible positions on the way would only lead to his extermination? Without command of the sea the chances of his bringing off a Dunkerque were too small to be worth consideration, and continued retreat may have been held to be the lesser choice of evils. The Axis in Tunisia is now lying between two powerful Allied armies, and when the ground dries enough to permit large-scale movements, big events may be expected.

The Axis supply lines from Sicily are admittedly short, but soon Tripoli will be available as a port of entry for the Allies, and Malta is now held to have been relieved from its partial state of siege.

TWO APIECE : Three pilots of a Spitfire IX station who each brought down two enemy aircraft in the recent daylight raid on London. (Left to right) Wing Cdr. A. R. M. Milne, D.F.C. and Bar, Sqn. Ldr. Hugo Armstrong and "Bob," of the "Ile de France" Fighting French squadron

BRITISH & U.S. AIR LOSSES TO JAN. 23rd.

	Over G.B. A'crft.	Over Continent B'brs.	Over Continent F'trs.	Middle East A'crft.
Jan. 17	0	22	4	5
,, 18	0	0	1	0
,, 19	0	4	0	4
,, 20	2	0	0	3
,, 21	0	0	0	6
,, 22	0	7	6	2
,, 23	0	4	3	1
(1 p'it safe)	2	37	14	21

Totals : West, 5,088 ; Middle East, about 2,059.

SIEGE GUNS BY FORTRESS : Boeing Fortresses are being used in New Guinea to transport 105 mm. howitzers, complete with ammunition, tractors and crews, to the battle area. On the right is Lt Gen. G. Kennoy, Commanding the Allied Air Forces in the S.W. Pacific

THE HAWKER TYPHOON

FIRST DETAILS OF OUR LATEST AND MOST FORMIDABLE FIGHTER : VERY HEAVY ARMAMENT AND A SPEED OF MORE THAN 400 M.P.H.

By THE EDITOR

ALTHOUGH it has been on operational duties for a considerable time, it was not until last week, when it figured so successfully in the bringing down of a large percentage of the German raiders which attacked London in daylight, that it became permissible to refer to the new Hawker Typhoon fighter. Its existence has been mentioned, but no reference to its achievements had been released until last week.

As is nearly always the case, Mr. Sydney Camm and his team of technicians had to base their new design upon an engine which, at that time, was not very much more than a gleam in the engine designer's eye. The engine designer in this case was Major Frank B. Halford, and the Typhoon was designed around the Napier-Halford Sabre engine-to-be. That began more than four years ago, when the general design of the Sabre had been pretty well decided, and when extensive single-cylinder research had given extremely promising results.

Actually, the Sabre *had* progressed beyond the general-design stage, and I well remember seeing a mock-up of the fighter which was afterwards to become the Typhoon. Napiers were busy test-running the few engines that had been built at that time, and to facilitate the design of the Sabre installation the company had made for Mr. Camm a very elaborate mock-up of the engine. This was built into the mock-up of the aircraft, and it was very obvious that, if the new engine came up to expectations, here would be a most formidable fighter, capable of great speed and of carrying extremely heavy armament. In those days, it should be remembered, we had not progressed very far with cannon, although the Hispano-Suiza (or Oerlikon) had put in an appearance and we were playing about with it in an experimental way. But the full-scale mock-up gave an indication of what could be done in the way of armament if and when something really "hefty" should come along.

Novel Design Features

The Sabre engine was something of a revolution in aircraft engine design. That it should be of the H-type was but natural, since Major Halford had already designed for the Napier firm the Rapier and Dagger, which were of this formation. In these two types air cooling had been used, but for the far greater power expected from the Sabre, Major Halford changed to liquid cooling.

While on the subject of the Sabre it may, perhaps, amuse readers to know that I had the somewhat doubtful honour of being the first Editor to mention it by name. That the honour is doubtful is due to the fact that publication of the sacred and secret word "Sabre" was due to a slip on my part. In a short article on Major Halford and his career I wrote, in the February 24th, 1938, issue of *Flight*: "Major Halford has designed for the Napier company the Rapier, Dagger and Sabre series, all 'H'-type engines." Needless to say, I got my knuckles soundly rapped by the Air Council, as was but fit and proper, but they very sportingly accepted my quite truthful explanation that, although I knew perfectly well what the Sabre was, at the moment of writing those words I had thought of it as the Service name for a sub-type of the Dagger series. And that was how it happened that *Flight* was the first journal in the world to refer to the Sabre by name.

I have mentioned these facts and incidents in order to convey a picture of the background against which the Typhoon was designed. They serve, in part at least, to explain why four years have lapsed between the design of the machine and the first official announcement of achievements by the production type. There was a long way to go, and it may be assumed that, as with every other new aircraft and engine type ever built, there were teething troubles to be overcome. The number of its successes (and the whole story of them has not yet been told) between the combined operations raid on Dieppe on August 19th and the present time appears to bear out the contention that any troubles which may have been encountered in the earliest examples of the Typhoon and its engine have been overcome, and that it forms a powerful addition to the equipment of Fighter Command.

"400 Plus"

Of the performance of the aircraft little may be said. It has been reported that its speed exceeds 400 m.p.h., and for a single-seater with an engine of somewhere around 2,000 h.p. that does not appear to be an exaggerated claim. From the fact that the engine is more powerful (and, therefore, heavier) and that it carries heavier armament, it may easily be deduced that it is likely to be larger and heavier than the Hurricane, unless Mr. Camm has become a convert to very heavy wing loadings. British designers do not tend to go so far in that direction as some foreign designers, being believers in high rate of climb and good manœuvrability, even at some small sacrifice in top speed. The Focke-Wulf 190 rather appears to show that manœuvrability *can* be combined with fairly high wing loadings (in that machine it is something over 42 lb./sq. ft.), and it does not seem likely that Mr. Camm has gone beyond that in the Typhoon, although I have no knowledge of the actual figure.

Structurally the Typhoon differs considerably from the Hurricane, and more extensive use has been made of stressed-skin construction.

CHANGES IN NAVAL AIR SERVICE CONTROL

THE Admiralty have announced that the post of Fifth Sea Lord, which has been in abeyance since Rear-Admiral A. L. St. G. Lyster, C.B., C.V.O., C.B.E., D.S.O., was appointed to a sea-going command, has now been filled by the appointment of Rear-Admiral D. W. Boyd, C.B.E., D.S.C., who assumes also the additional title of Chief of Naval Air Equipment. The present Chief of Naval Air Services, Admiral Sir Frederic C. Dreyer, K.C.B., C.B.E., becomes Deputy Chief of Naval Air Equipment, and the post of Assistant Chief of Naval Air Services, held by Rear-Admiral R. Bell-Davies, V.C., C.B., D.S.O., A.F.C., is abolished.

In addition to his duties in respect of naval air material and equipment, the new Fifth Sea Lord will be available to advise on matters relating to personnel of the Fleet Air Arm and their conditions of service.

Fighter Design

Individual Designers' Solution of Structural Problems : Girder or Monocoque? : One, Two or Three Spars? : Five Representative Types Examined

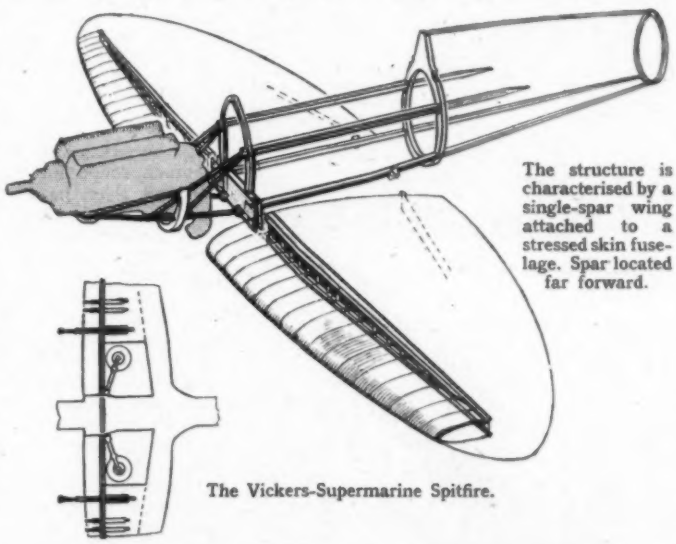
MOST military aircraft are designed to a Government specification, and usually it happens that the choice of engine is already decided for the aircraft designer, either by the fact that only one type of engine having the desired characteristics is available at the time the design is contemplated, or because it has been officially decided that the particular aircraft type is to have liquid-cooled or air-cooled engines for operational reasons.

IN the sketches in this article intermediate fuselage formers have been omitted in order to emphasise the main structure members. The same applies to the wings, in which ribs and stringers have been omitted.

Thus it may be assumed that in the vast majority of cases the aircraft designer starts work with a given power plant, basing his design fundamentally on that particular engine, probably hoping, and allowing for the fact in the design, that by the time his aircraft is in production a slightly improved version of the engine will have become available.

In view of the variety of single-engined fighters in use by the belligerent powers, we have thought it of interest to show to how great an extent the individuality of designers can and does influence design. In the main, all these fighters were designed with very similar objects in view, and it might have been thought that they could not, therefore, differ greatly one from the other.

To some extent that is so in the case of the aerodynamic design. Here there is not much scope for pronounced individualism. The engine has to go in the nose of a fuselage which, in turn, has to be of the best possible streamline form. The smallest pair of wings capable of carrying the stipulated loads of fuel and armament and landing them at a tolerable speed is chosen, bearing in mind also problems of climb and manœuvrability. The undercarriage must retract, and means have to be provided for cooling the engine. Except for "freak" designs, there is thus relatively little the aircraft designer can do.



The structure is characterised by a single-spar wing attached to a stressed skin fuselage. Spar located far forward.

The Vickers-Supermarine Spitfire.

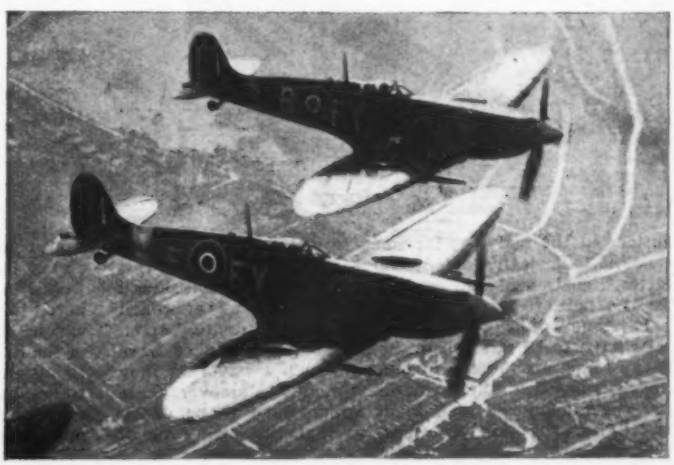
Choice of Alternatives

When, however, it comes to the structural design there is a far greater choice of alternatives, and an examination of existing single-engined fighter types reveals a rather surprising variety of "systems." We have picked five of these as being fairly representative, although several more could have been included without exhausting the types.

Here it might not be out of place to call attention to a fact which is too often overlooked. The percentage of weight over which the aircraft designer has any control is surprisingly small. He is given an engine of a certain power and weight. Usually the flight duration, and therefore the weight of fuel, is stipulated in the specification. The armament, that is to say, the types and number of guns and the number of rounds of ammunition, is probably also decided already, not to mention the extensive military and instrument equipment.

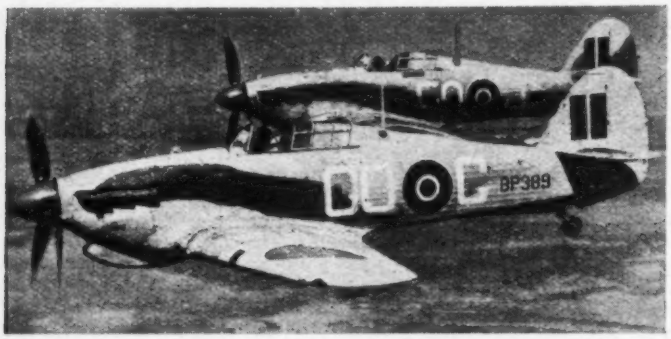
It will thus be seen that the unfortunate designer is left with the main aircraft structure only on which to exercise his ingenuity. And even here he probably has not an entirely free hand. He might wish to adopt certain forms of construction which would be light and strong, but some of the materials, or his favourite "sections," might be in short supply, or might be slower to make, and so, out of considerations of production problems, he may be forced to compromise.

Broadly speaking, fuselages are of two main types: the girder type, in which the material is concentrated into struts and ties; and the so-called stressed-skin type, in which the material is disposed almost entirely at the



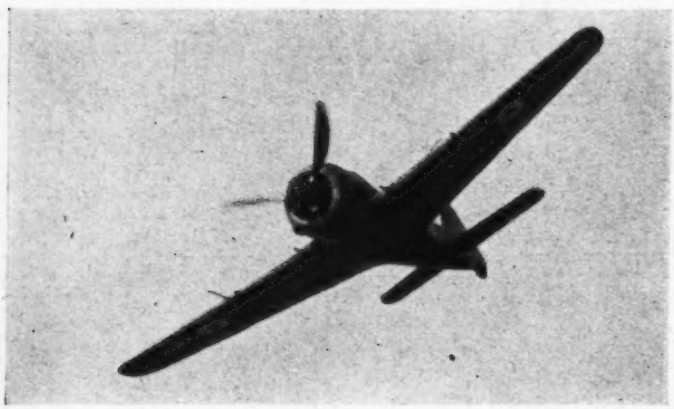
D

FIGHTER DESIGN



Hawker Hurricane

North American Mustang.



Fw 190

surface of the body, as far away from the neutral axis as possible. Basically one would say that because of this latter, the stressed-skin or shell type of construction should be the lighter. If a fuselage were merely an unbroken shell, that would probably be so, but unfortunately openings have to be cut in the shell, and the loads then have to be taken around the openings in such a way that they are distributed to the surrounding metal. Moreover, there are several concentrated loads which have to be distributed into the skin structure, so that the shell type of construction can hardly ever be used in its fundamentally light form.

Even allowing for considerations such as those outlined above, however, it appears likely that the stressed-skin type of construction *is* lighter than the girder type. But here certain practical considerations enter into the problem to add further difficulties to the designer's choice. There is no gainsaying the fact that the girder type of fuselage does afford a better opportunity for installing the multitudinous equipment which is something of a nightmare in a modern military aircraft. Workers can reach in between the girder members to get at the equipment being installed, and a considerable number can work on one fuselage at a time.

With the shell type of construction this is not so, and as a fighter is always small in proportion to the equipment it has to carry, workers often have to be contortionists when lying flat on the floor while attaching certain equipment. Attempts have been made to get over this trouble by using a "split" form of construction, in which the equipment is installed on a portion of the fuselage only, the shell being completed after the equipment is in by riveting-on the remaining portions of skin.

That would be quite satisfactory if there were no such things as, inspection, maintenance and repairs, not to mention the relative certainty of damage by enemy action, which frequently necessitates opening the "can" with a tin-opener, so to speak.

Wing Variations

In the case of the wings there is not quite so much scope for alternative arrangements. The fact that the wings of all modern high-performance aircraft must perforce be metal-covered limits the broad principles of construction to single-spar, two-spar and multi-spar construction. In the single-spar wing the leading-edge has a thicker covering so as to form, with the spar, a sort of D-section box which is stiff torsionally, while the spar takes most of the bending loads. In the two-spar type of construction the spars share the loads and the skin assists in resisting torsion. Multi-spar wings are not very common, as they have to be very light individually and several may have to be "cut" for undercarriage wheel wells, armament or tanks.

There are, of course, many more vexed problems for the designer to solve, but perhaps sufficient has been said to give a fair idea of the extent to which aircraft structural design is a series of compromises between conflicting requirements. Now let us examine a few representative examples.

Basically the design of the Vickers-Supermarine Spitfire comprises a single-spar wing attached to a stressed-skin fuselage. The diagrammatic sketch on page 89 shows that there is a very considerable concentration of stress at the point where the single main spar is attached to the fuselage; the lower engine bearer members are attached to the cross-member running across the fuselage, as are also the undercarriage struts. Loads from the upper engine attachment points are distributed to the skin of the fuselage by way of the top longerons, which extend to the aft main fuselage former. In the sketch of the Spitfire, as in the sketches of the other four fighters, the lighter intermediate formers have been omitted in order to emphasise the main structure members which, with the stressed skin, form the primary structure. Aft of the rear main former the top longerons trail off to nothing, while

the bottom longerons are of lighter construction than those in the forward portion of the fuselage.

The undercarriage legs fold outwards; this has the advantage that the loads are concentrated close together, and the high stresses generated when undercarriage legs are attached to the wing spar some distance outboard are avoided. The disadvantage is that the wheel track is relatively narrow. The armament, in this case two cannon and four machine guns, is of necessity carried outboard of the wheel wells in the wings.

The Spitfire is a good example of the single-spar wing with strong leading-edge covering forming a torsion-resisting "tube." The small auxiliary spar has relatively little work to do.

Girder Construction

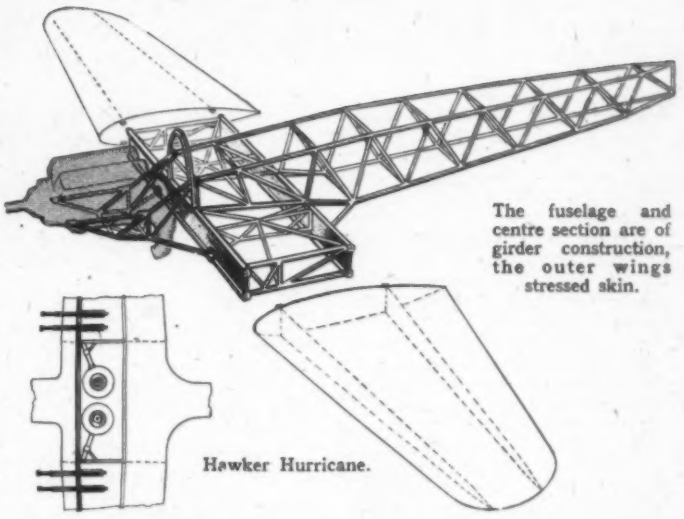
The Hawker Hurricane may now be said to be the only fighter example still in extensive operational use of girder-type construction. Reference as made above to the greater facility with which equipment can be installed in a fuselage of this type, owing to the fact that workers can reach the equipment through the openings between the ties and struts.

In the case of the Hurricane there was, however, another reason for retaining the girder type. The Hawker firm had for many years specialised on this form of fuselage construction, and in the "old biplane days" rolled and drawn steel strip construction had been used for the wing spars. The manufacturing processes thus did not present any unknown problems, and Mr. Camm, bearing this in mind, and foreseeing the possibility of delays in getting into production if a change to shell construction had to be made, decided to adhere to the type of structure with which he and all the staff and workmen were familiar.

The result was the first Hurricane in which, it may be remembered, the wings were also of girder construction and fabric covered. The later Marks of Hurricane have stressed-skin outer wings but have retained the girder fuselage and wing centre section, as shown in the sketch. That the type of structure originally designed was amply strong for its work will be realised when it is recalled that originally the Hurricane weighed some 6,000 lb. loaded, and that recent versions have tipped the scales at 50 per cent. more than that. This was not done without increasing the gauges of material used in the structure, of course, but it *was* done without making major structural alterations.

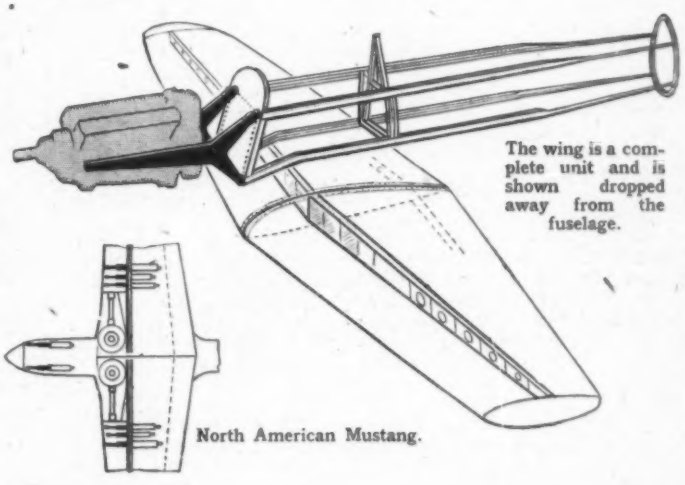
Both in the Spitfire and in the Hurricane there are centre-section spars. In the former the spar is contained within the fuselage and the wings "buttoned on" close by the fuselage sides. In the Hurricane, on the other hand, the centre section is of fairly large span, and the joint of outer stressed-skin wing to girder centre section occurs a considerable distance outboard.

For sheer simplicity of design "motif" it would be difficult to improve on the type of construction employed in the North American Mustang, which combines a single-spar wing with a very simple stressed-skin fuselage. The two are complete units in themselves and attached to one another by four bolts only. It should, perhaps, be explained that the sketch of the Mustang, as well as the other sketches, tend to give a slightly false impression in that intermediate fuselage formers are omitted and only the main formers shown. The four longerons run through to the tail, but are tapered off towards their rear ends. At the front they carry the engine bulkhead, to which is attached at four points the fork ends of the very simple engine bearers. These are of box section



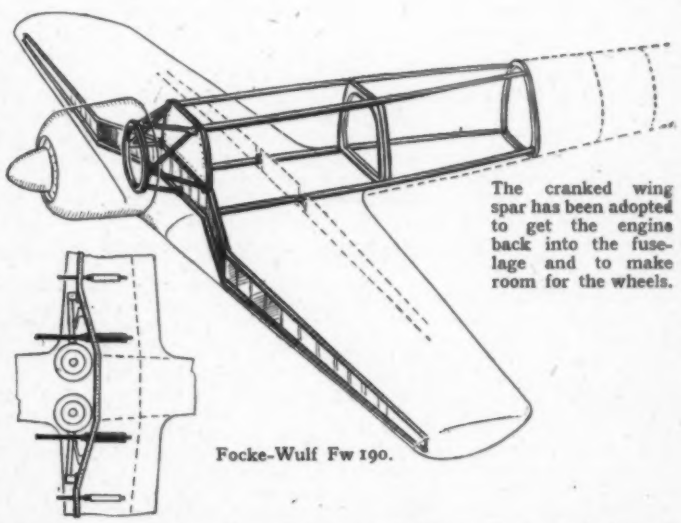
The fuselage and centre section are of girder construction, the outer wings stressed skin.

Hawker Hurricane.



The wing is a complete unit and is shown dropped away from the fuselage.

North American Mustang.



The cranked wing spar has been adopted to get the engine back into the fuselage and to make room for the wheels.

Focke-Wulf Fw 190.

FIGHTER DESIGN

and built up of sheet metal channels and plates, riveted together. The neatness of these engine bearers must be paid for in the form of a certain amount of additional weight, since there must be a fairly heavy stress concentration at the point where the three limbs of the "Y" branch out.

It is interesting to compare the Mustang wing with that of the Spitfire. In the latter the spar is placed fairly far forward in the wing section, but in the Mustang it is located at a point roughly corresponding with the centre of pressure, so that when the c.p. moves aft at high speed (small angles of incidence), the torsional stresses imposed are not high.

The Mustang wing is, as already mentioned, built as a complete unit, composed of the two wing portions, bolted together on the centre line. It is offered up to the fuselage as a unit, and attached to it by four bolts.

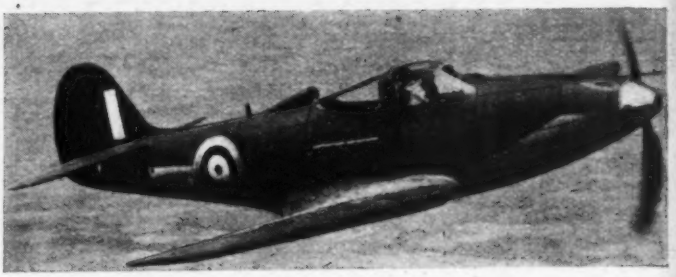
One result of placing the single spar fairly far aft is that the wing guns, mounted on the spar, do not project through the leading-edge as is the case when they are mounted on the front spar of a two-spar wing, or on a single spar placed far forward, as in the Spitfire. Another advantage of locating the single spar fairly far aft is that it becomes possible to house the retracted wheels in front of the spar, where the greatest possible space is available.

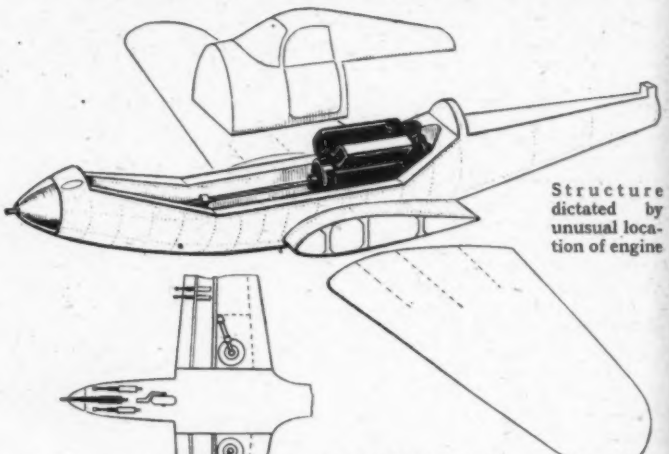
Compactness was obviously the aim of the designer of the Focke-Wulf Fw 190. He started with a radial engine, very closely cowled, and brought it as far into the fuselage as possible. Like the designer of the Mustang, he chose a single-spar wing construction, but placed it very far forward.

In the outer wing portions the spar is very close to the leading-edge. To continue it in that position would have precluded the possibility of housing the wheels ahead of the spar, and to overcome the problem the designer of the Fw 190 cranked the spar as shown in the sketch. This not only enabled him to attach his engine ring at five points by a triangulated structure of tubes, but brought the central portion of the spar back to the region of the centre of pressure. The writer of these notes would not care for the task of stressing the wing of the Fw 190!

From a practical point of view it may be argued that the Fw 190 type of structure, with the wing built almost integral with the fuselage, does not make for ease of repair in the field. The fitting of a new wing must be quite a task.

The Bell Airacobra is unorthodox in every way so far as structural design is concerned, yet in external appearance it does not differ greatly from other single-engined fighters. The form of construction shown was almost inevitable, once it had been decided to place the liquid-cooled engine in the fuselage, aft of the pilot.





The Bell Airacobra.

One might express the Bell system either as a chassis-built fuselage, with the wing and engine loads taken direct to the chassis members, or perhaps better regard it as a sort of boat hull (using the expression in the purely nautical sense and not as relating to flying boats). The lower half of the fuselage, in the region of the engine and pilot, is the backbone of the machine, and to it are attached the engine and the wing roots. The forward part has to be torsionally strong in order to resist the torque reaction from the airscrew reduction gear placed in the nose. It also has to house the front wheel of the tricycle undercarriage.

The tricycle undercarriage has its two rear wheels farther aft than the wheels of the conventional undercarriage, and in the Airacobra they are housed, when retracted, behind the central main spar. The armament is located partly in the wings, outboard of the undercarriage wheel wells, and partly in the nose of the fuselage.

PILOT OVERCAME SIGHT HANDICAP

THE only operational pilot in Fighter Command to wear contact lenses—"invisible" glasses which fit closely against the eyeballs inside the eyelids—has been promoted to the command of a Whirlwind fighter-bomber squadron which operates from a station in the South of England.

He is Squadron-Leader Geoffrey B. Warnes, a 28-year-old Leeds man who, in peacetime, played Rugby football for Headingley. He learned to fly at the Yorkshire Aeroplane Club at Yeadon, where his instructor was "Ginger" Lacey, better known as Squadron-Leader J. H. Lacey, D.F.M., and Bar, one of the six highest-scoring pilots in Fighter Command.

The day after war was declared, Warnes, who then wore spectacles, volunteered as a pilot. He was rejected because his eyesight was not good enough, but was later commissioned for ground duties in the Equipment Branch.

After serving in France he was eventually posted to a flying refresher course and became a qualified instructor. After several months of instructing—all this time he was wearing spectacles—his hopes were blighted by the medical verdict that he was unfit for operational flying duties because his vision was too bad to be corrected by lenses incorporated in flying goggles—as is the usual practice. Warnes, who had read of contact lenses, travelled to London and within a week had been fitted with a pair. This cost him £50, since contact lenses are still in an experimental stage and can be made only by a few highly skilled craftsmen. For this reason, the adoption of contact lenses cannot be general in the R.A.F.

Again Warnes sought a medical examination and this time was passed as a special case, took the fighter pilot's course and, 16 months ago, was posted to the squadron he now commands.

During those 16 months Squadron-Leader Warnes has been on low-level attacks on targets in occupied territory, and was on the first operation when the Whirlwinds, newly converted into fighter-bombers, sank two armed trawlers off Cap De La Hague last September.

International Air Police Force

Lessons from British Empire : Political Problems to be Faced

By "AJAX"

CONSIDERABLE interest has been shown by readers of *Flight* in the tremendous possibilities of an International Air Police Force to prevent future aggression. This interest was aroused by Lord Brabazon's Wright Memorial Lecture to the Royal Aeronautical Society, in the latter part of which he advocated the control of all flying and the building-up of a force that would guarantee all States against aggression and would undertake the policing of the world. Some of the difficulties in this problem have been pointed out by readers, and we should do well to examine them and try to produce a practical plan.

When formulating our plans for a new world, we must not fail to learn one vital lesson from the British Commonwealth of Nations. It formed a loosely knit League of Nations and embodied no real federal principle, except defence. Imperial defence was the chief function of government assumed by the central authority. This British league stands to-day; the new and larger League of Nations with its headquarters in Geneva has crumbled, largely because it had no force for its defence.

Federated New World

The new world might well be formed into six Federations, as advocated by Lord Davies in his recent book, "Facing the Future; Letters to John Citizen." First, the British-American Commonwealth; then a European Federation; then a Soviet Union of Socialist Republics as a Federation in itself; then a Far Eastern Federation; then a Federation of the South American Continent, and, lastly, India, including Iran and Iraq. These six Federations would form one World Confederation with a Council of six. This World Council must have direct control of an International Force.

Critics of such a plan maintain that the real trouble lies in the inequitable distribution of the wealth of the world, in greed and in selfishness; that there will be many genuine social and economic problems that are the legacy of the too-rapid material progress of the last hundred years; that these disputes are the disease, and that war is but the sympton. Improvements in the world's condition are certainly needed, but they will be more rapidly achieved under a strong International Authority. There are injustices in national life also, constantly needing redress; but we wisely maintain a strong police force to keep the peace, to prevent bloodshed, to prevent matters getting out of hand, and to encourage an improvement of social conditions by constitutional means.

World Federation in some form or other, including a common defence policy, has been advocated by the Liberal and Labour Parties, and by many of the world's leading statesmen; these include our courageous and far-sighted Prime Minister, and Viscount Cecil, who has put in a special plea for the creation of an International Air Force, charged specifically with the duty of preserving peace in accordance with the directions of a World Confederate General Staff. Field-Marshal Smuts, another statesman with wide experience of the League of Nations, has recently said that "To preserve world peace we shall have to start another mechanism—perhaps to run alongside the League of Nations." Sir Stafford Cripps, in a recent broadcast to America on "The United Nations of a Free World," said: "The power of the air, which daily shows itself in growing strength, provides an opportunity which has never before existed for the control of world order. An International Air Force could reach the most remote corners of the world and could strike at any who sought to break the peace for their own advantage."

The real difficulty in creating an International Force is the political one, as J.-M. Spaight has pointed out; it is up to the expert to show that the idea is practical and can be worked if required. There are controversial problems that must be faced if we are not to find ourselves as unprepared for peace as we were for war. There is an urgent need for the British people to study and appreciate the advantages of certain forms of Federalism and for the Government's advisers to draft a plan for the defence of the world against aggression. We are fighting to establish a more secure world, and we must show Europe that we have a real and concrete plan. A mere negative aim—to destroy Hitlerism—is not enough. A burning sincerity of purpose will stimulate us in our fight and give hope to those in occupied countries.

The International Force should be primarily an air force, having control of civil as well as all military aviation. Uncontrolled, the air forces of the world are the greatest menace to world peace, and this is the arm that most urgently needs to be harnessed to the international authority. The easiest form of military co-operation to arrange is that of air forces, and the increasing range and power of air forces is likely to make co-operation on an international scale a comparatively simple operation. This view receives the support of Sir Frederick Maurice in his recent study, "Lessons of Allied Co-operation, 1914-1918."

Strategic Organisation

It is essential that this force should be centrally directed and independent of the Federations. For the strategic control of the world it might well be organised into five main Regional Commands:—

(i) European Command with Headquarters in Great Britain.
(ii) Pan-American Command with H.Q. in America.
(iii) Russian Command with H.Q. in Russia.
(iv) Eastern Command with H.Q. in India, China or Australia.
(v) African Command with H.Q. in the Middle East.

The International Force, though primarily controlling air forces, might also have under its immediate control a small and mobile army and a small navy, as valuable auxiliaries for certain operations. Within certain limits the United Nations should be permitted to retain national armies and navies; but these, shorn of their air auxiliaries and possibly denied tanks or submarines, would be no serious menace of the power of the World Confederation. In planning for the future we must visualise air power as it will be a few years hence; we need some of the vision shown in "Victory through Air Power," written by Major Seversky, a clear-sighted and far-sighted apostle of true air power.

Each of the Regional Commands should have a Controller of Civil Aviation, who will co-ordinate all main air lines and license all aircraft in that Region. There will be no geographical barriers for civil aviation. It is important that military and civil aviation should work closely together, since, with the progress of years and the establishment of a more secure international system, it will be possible to reduce the military side and rely more upon

INTERNATIONAL AIR POLICE FORCE

civil aviation. The size of some of the Regional Commands may at first seem too large, but the world has shrunk as the result of rapid travel and communications, and air control over a very large area will be found possible.

The key personnel of the International Force would be liable to posting from one Command to another, thereby gaining a more international outlook. Aircraft and equipment, being designed for a special purpose and locality, and with special local maintenance facilities, would not normally be transferred from one Command to another; nevertheless, complete units might be moved in order to meet a special threat. The International Force would be highly mobile, making maximum use of air transport. Its function is to enforce international law, and this is a function of police.

Allocating the Cost

The cost of maintaining this force would rest in proper proportions upon all countries of the world, and it should not be difficult to fix a suitable formula, e.g., the Barême, used by the League of Nations for determining the national contributions to the League budget; nor should it be difficult to persuade the exchequers of the world that in the end this is a cheaper and more satisfactory way of maintaining peace than another competition in armaments. The Axis Powers must contribute, but at first will be allowed no part in the International Force, though they would be represented on the Councils of their Federations. Economic sanctions would be imposed on any defaulter or aggressor, force being always at hand if required.

The composition of the force must inevitably be largely Anglo-American in its early stages; but it must form a solid foundation upon which to build a force that is truly international in character. In the course of time our present enemies would be drawn into the scheme, for we aim at world co-operation and not penalisation, as Lord Brabazon has reminded us. The Headquarters and Permanent Secretariat of the International Force would probably be in America, detached from most of the world's danger spots. The European Command, which presents the main problem, would be largely organised by British personnel during the interim period immediately following the war; after this period of perhaps ten years the British genius for organisation should have made it possible to include other units or personnel, making the force truly international in character.

International Fighter Command

The Air Ministry would become the headquarters of the European Command, absorbing the appropriate percentage of units and staff from America, Free France, etc. It is interesting to observe that in Fighter Command at the present time there is virtually an International Air Force consisting of Americans, Poles, Czechs, Belgians, Norwegians and Free French. They have produced convincing proof that loyal co-operation and cohesion is possible amongst men of various nationalities and tongues, when banded together in a world cause. The comparatively small military and naval units required could be quickly and efficiently brought under the supreme command of the European Commander-in-Chief. These units would be detached from the control of the War Office or the Admiralty, who would continue to administer the forces remaining in national hands.

The cause of all trouble lies deep in the heart of man, who appears to have made but little progress in the past 2,000 years. Yet signs are not wanting that Christianity is going to be a real force in our lives; that it is going to influence our political, social, economic and international outlook. To place force in international hands is at once the logical and the moral attitude. It might well prove to be the means of establishing a wider and permanent system of general security, and provide (again in the words of the Atlantic Charter) a practical measure which will lighten for peace-loving peoples the burden of armaments.

American opinion, as voiced by President Roosevelt, Mr. Wells, Mr. Hull and Mr. Wendell Willkie, has decided that the United States can best serve its interests and discharge its responsibilities by joining with the other free peoples of the earth to promote an international order which can maintain the peace of the world. The American people are clearly in favour of bearing their fair share of responsibility for the maintenance of world order, but only their share. They are not prepared to co-operate with Great Britain in forming an Anglo-American force to dominate the world; many would prefer to return to a policy of isolationism.

The United Nations must re-establish the League of Nations or some form of world federation, and must organise alongside it an International Force to police the world. Without such a Force there can be no security against aggression. Mr. Eden has laid down that (1) the machinery of peace must be fully representative of the Powers who mean to keep the peace. (2) The Powers must have unity and determination to arrive at agreed and positive decisions. (3) Most important of all, they should have force behind them.

The International Force must then be planned to include personnel or units from some at least of the occupied countries and such neutrals as Turkey who have a right to participate in the control of European affairs. There must be real unity, a force under single command, and under the direct control of the International Authority; this is essential if success is to be achieved and peace established. — The problem is a complex one, but surely not beyond the wit of man. We have seen the degree of loyal co-operation that is possible on the field of battle. Cannot a great ideal and a glorious objective stimulate us to co-operate in times of peace?

A solution to this great problem is urgently required. Freedom from want is now receiving eager attention, as the result of Sir William Beveridge's plan. Freedom from fear of aggression is a no less urgent problem. There must be freedom of speech and frank discussion of the difficulties involved. A generous British plan, acceptable to America, Russia and the smaller peaceful Powers, will do much to encourage the world in its struggle against German tyranny.

OIL REFINING IN GREAT BRITAIN

THE possibility of large-scale oil refining in this country was examined by Dr. G. Tugendhat, M.Sc.Econ., director of the Manchester Oil Refinery, Ltd., in an address delivered to the British Institute of Plastics on January 13th.

The main purpose of the address was to prove that it would be worth while to import the crude oils instead of the refined products, since almost every imaginable one of these is of great utility nowadays. Dr. Tugendhat stressed the advantages to the plastics industry of unlimited supplies of cheap raw materials, and although these have not so far come into extensive use for the primary structure of aircraft, there is little doubt that in time plastics will be so employed. Thus the subject is of some interest to the aircraft industry of this country. It should not be forgotten that in the early stages of any refining process there have always been many by-products which were at first regarded as waste, but valuable applications of which were soon discovered.

What is of immediate interest to the aviation world is that, as Dr. Tugendhat pointed out, if we were to import crude oils on a large scale and do the refining in this country, the shipping difficulty would be eased to this extent that the crude oil could be transported across the Atlantic in the bottoms of merchant ships, since contamination would not matter, and the cracking gases, which are now the main source of aviation fuel blending stock, could be extracted in this country.

To back up his argument, Dr. Tugendhat pointed out that in the United States of America most of the crude oil is refined not close to the oilfields, but in the centres of consumption.

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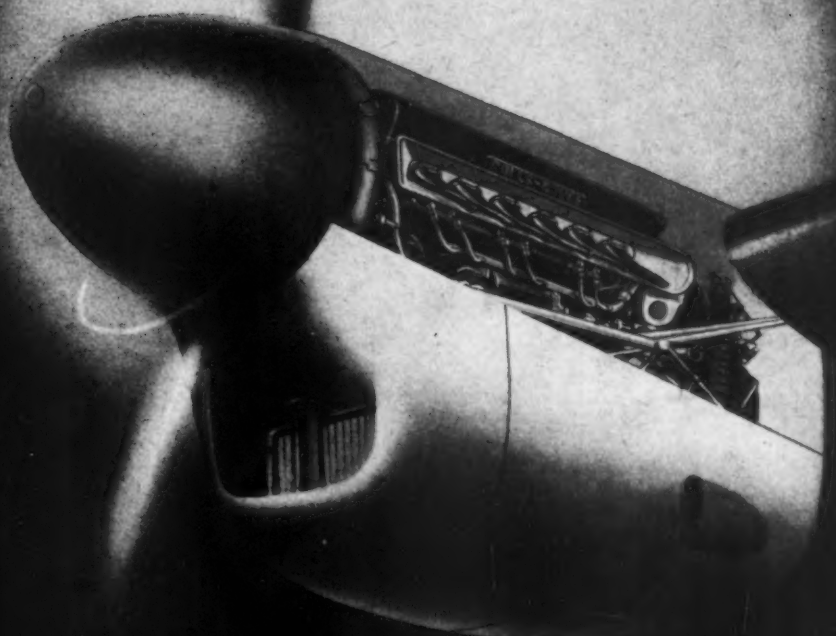

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DOUGLAS B-19

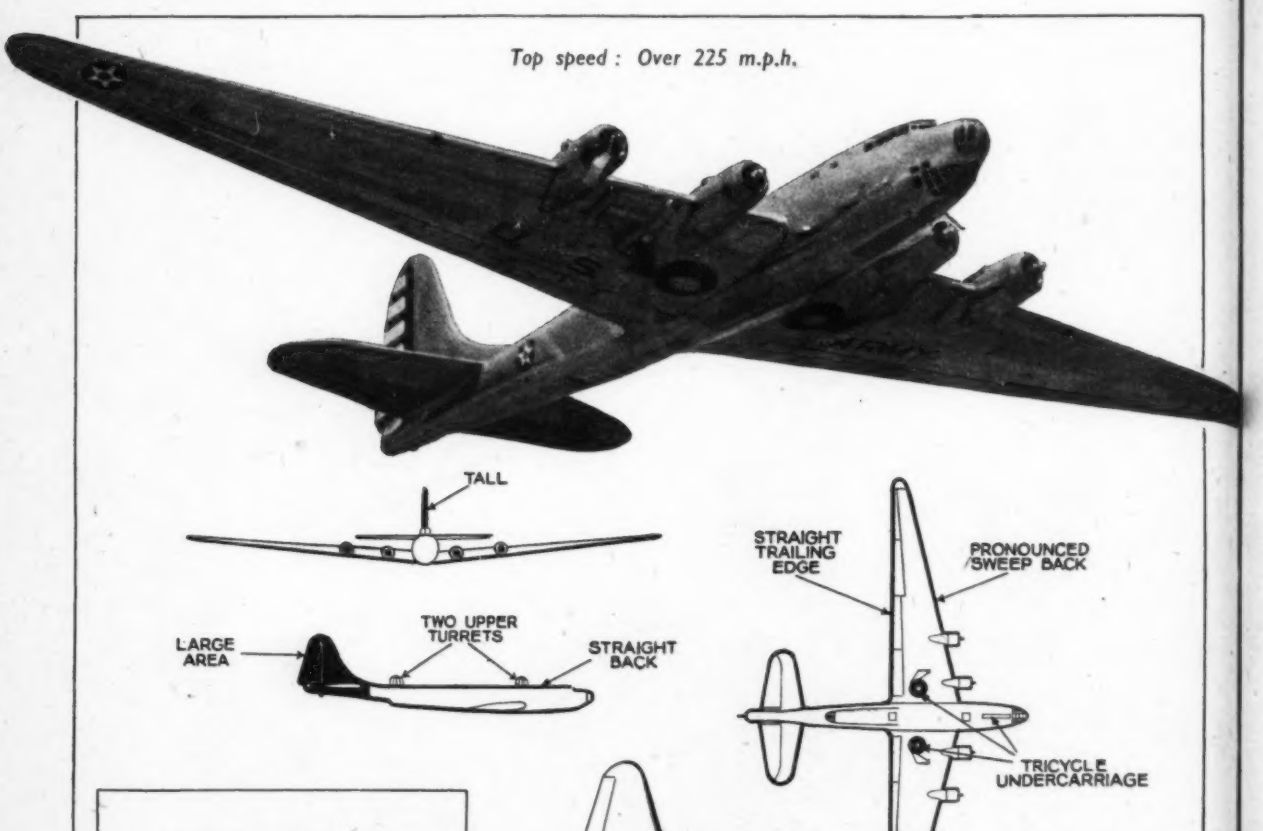
FEW new aircraft created such world-wide interest as did the advent of the Douglas B-19, a machine which really did merit the use of that somewhat overworked phrase, "giant bomber," since it was the world's largest aircraft by quite a useful margin.

The original contract for its construction was signed in 1935 and, though the difficulty of keeping such an enormous object a secret can well be imagined, work went on behind huge canvas screens draped from the roof trusses of the Douglas factory at Santa Monica. An interesting point about the methods employed in construction was that the mighty wing, spanning 212ft., and the centre section of the fuselage, were built up in a vertical position and afterwards lowered into the horizontal for assembly with the nose and tail sections.

It is of all-metal, aluminium alloy stressed skin construction, and, with its large but graceful single fin and rudder, is typically Douglas in appearance. Being designed for military purposes, its fuselage is slim and the high aspect-ratio wings are backswept on the leading-edge to very small, rounded tips, the trailing-edge being straight. The tailplane, however, is of only moderate aspect-ratio, and with a medium degree of taper to comparatively broad, round tips. A tricycle undercarriage is employed, the main wheels retracting inwards into recesses beneath the wings.

The B-19 is powered by four 18-cylinder Wright Duplex-Cyclones each developing some 2,000 h.p. for take-off, and although their combined maximum output is none too much to cope with the 140,000 lb. loaded weight of this aircraft, the makers' idea was that by the time they had "got the bugs out" of this new monster, engines of even greater horse-power would be available. Incidentally, the engines of the B-19 are attached to their nacelles at nine points by the cylinder heads of one row of cylinders, the nacelles being sheet-metal structures without internal bracing. This dynamic suspension mounting incorporates small links to allow for expansion. Top speed is over 225 m.p.h., cruising speed over 200 m.p.h., service ceiling over 20,000ft., and maximum range nearly 6,000 miles.

When it made its maiden flight in the summer of 1941, the insurance premium for the first minute was said to have been £20,500, the machine being covered for £250,000. After the first minute the rate dropped to £750 per hour.

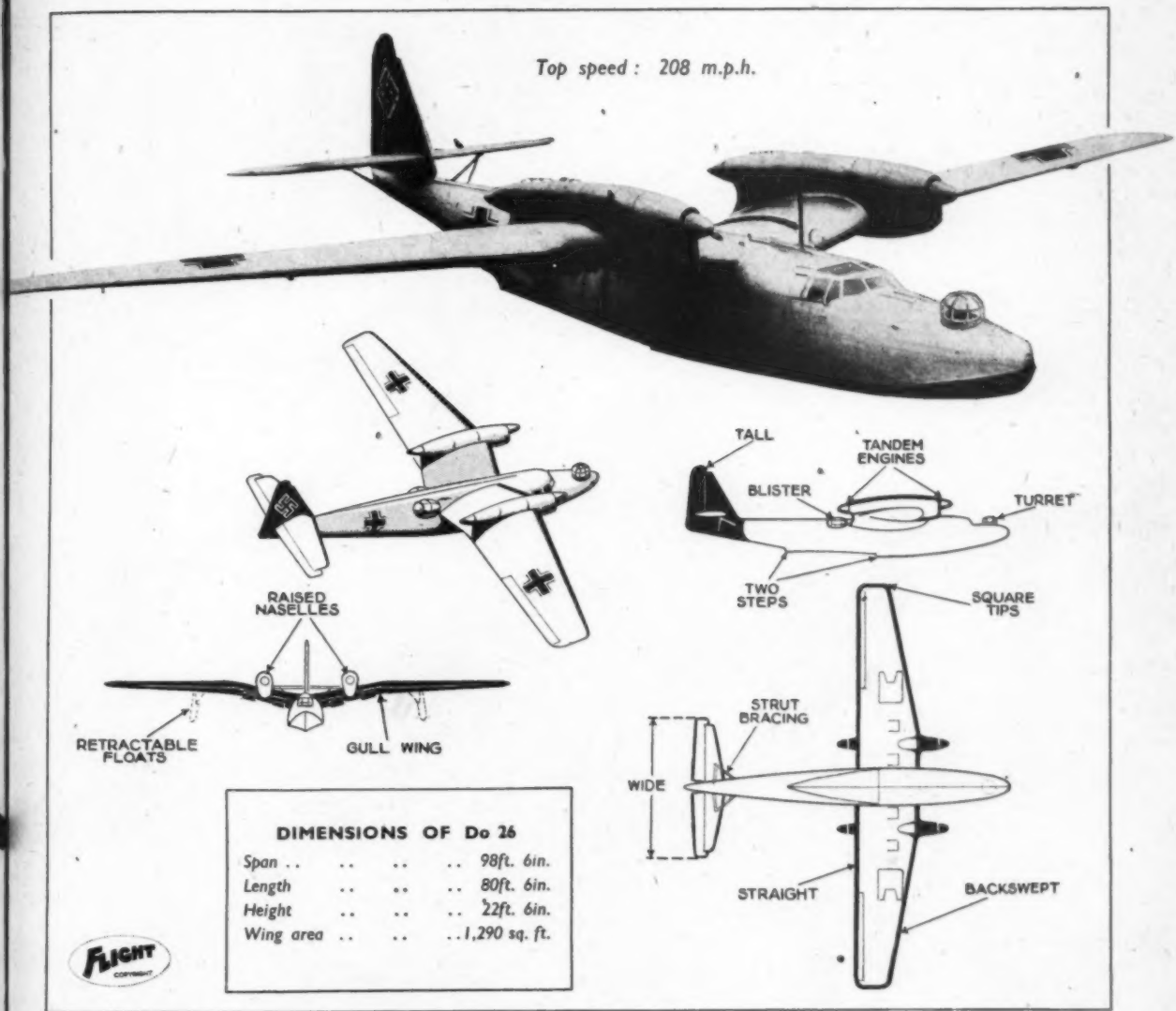


DIMENSIONS OF B-19

Span	*212ft. 0in.*
Length	*132ft. 4in.*
Height	*42ft. 0in.*
Wing area	*3,700 sq. ft.*

dheir Characteristics

DORNIER Do 26



DIMENSIONS OF Do 26

Span	98ft. 6in.
Length	80ft. 6in.
Height	22ft. 6in.
Wing area	1,290 sq. ft.

FLIGHT COPYRIGHT

ORIGINALLY designed for the *Lufthansa* North Atlantic mail service, the Dornier Do 26 four-engined flying boat incorporates a number of very interesting features which were quite new to Dornier designs at the time of introduction.

Perhaps the most notable change from previous Dornier flying-boat practice was the abandonment of sea wings, or sponsons, in favour of retractable stabilising floats which fold inwards, and the employment of cantilever gull-type wings. The engine nacelles are mounted at the extremities of the centre-section stubs which are built integral with the hull, and the outer panels of the wings taper in thickness on the underside, so that the upper surfaces are flat, but there is a small dihedral angle on the under surfaces.

The strut-braced tailplane is mounted on the large single fin which is integral with the hull.

Each nacelle houses a pair of Junkers Jumo diesel-type engines in tandem, so that the boat is driven by two tractor and two pusher airscrews, another interesting feature being that the two rear engines can be canted upwards through about ten degrees to raise the pusher airscrews clear of the spray from the chines of the hull during take-off. Once in the air, the rear engines are lowered to the normal position in line with the front pair.

The Jumo engines are the 600 h.p. six-cylinder 205 C type, which have double, opposed pistons sharing a common combustion space and functioning on the two-stroke principle. Each set of six pistons drives a crankshaft above and below the double cylinders, the shafts being coupled together by a train of gears down the front of the engine.

The all-metal, two-step hull, which is stressed for catapulting, has eight watertight compartments, and its armament comprises a power-operated gun turret mounting one 23 mm. cannon on the long, slim nose, and "Catalina"-type blisters immediately aft of the trailing edge; these latter mount machine guns.

Top speed of the Do 26 is 208 m.p.h., cruising speed 193 m.p.h., and range 5,600 miles.

MORRISONS

CROYDON
PRESTON, TADWORTH
AND PETERBOROUGH

AIRCRAFT CONSTRUCTION AND REPAIR

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

Plastic Union

THE producers of plastic materials and parts in Germany have for the last eighteen years been organised into a technical union.

The aim of this organisation is to foster the standardisation of quality and designs of plastic materials and products. Members of the union submit their products to a technical watching committee and if approved they carry a special sign signifying their quality.

Recently negotiations took place between this German organisation and representatives of the Italian plastic industry, which resulted in the formation of a joint organisation.

The main object of this co-ordination is to introduce uniform and simplified specifications and standard types of plastics with special reference to their employment in the aircraft industry. It is said that the scope of this new organisation is to be extended to other Axis countries.

More A.R.P.

BY order of the chairman of the Reich's A.R.P. organisation special courses are being organised for the training of Civil Servants and A.R.P. officials in the rural districts of Germany. In the expectation of intensified and wider spread R.A.F. raids on Germany, the object of these courses is to provide the agricultural population with a more effective civil defence.

Three regional centres have been created, namely, at the agricultural school at Kurmark, near Oranienburg, for the north and west, on an estate in Upper Bavaria for the southern and south-eastern regions, and on an experimental estate of the Poznan University in Occupied Poland for the eastern regions of the Reich.

DISCLOSED. A bomb storage and munition depot of an Italian air force group has been installed in these huge caves blasted in a solid rocky hill in Sicily.

An Ace's Armour

THE German Press gives wide publicity to Major H. Graf, the latest *Luftwaffe* Ace, who is called "the most successful fighter pilot in the world." Graf is at present stationed on the Russian front, and is said to have made 530 operational flights since August 3rd, and to have shot down 202 aircraft on that front. Apparently the Nazi Ace believes that a British uniform brings luck to its wearer, for interviewed by German journalists on the occasion of his 400th engagement, Graf said that on his flights he always wears an old British khaki tunic which he took from a Tommy in Crete.

Conversion

UNCONFIRMED enemy reports state that fast Axis steamers had been converted into miniature aircraft carriers which were "of importance in convoy protection." It is presumed that they are to operate in the Mediterranean area.

In Retreat

IN the Axis attempts to stem the Russian advance in the Don Bend, Italian Air Force units are reported to have been employed. These units have been engaged in reconnaissance work and in co-operation with infantry. While it is now known that their efforts were not crowned with success, Italian broadcasts from Rome state that owing to unfavourable weather conditions Italian fighter and reconnaissance aircraft engaged in the ground battle had to operate frequently at 600ft. altitude in support of the retreat.

From these reports it is evident that Italian fighter units were engaged mainly in delaying tactics by blowing up bridges, etc., while the transport formations of the *Regia* are employed in the Don sector in the carriage of supplies to encircled Italian and German troops.

Regia's Best

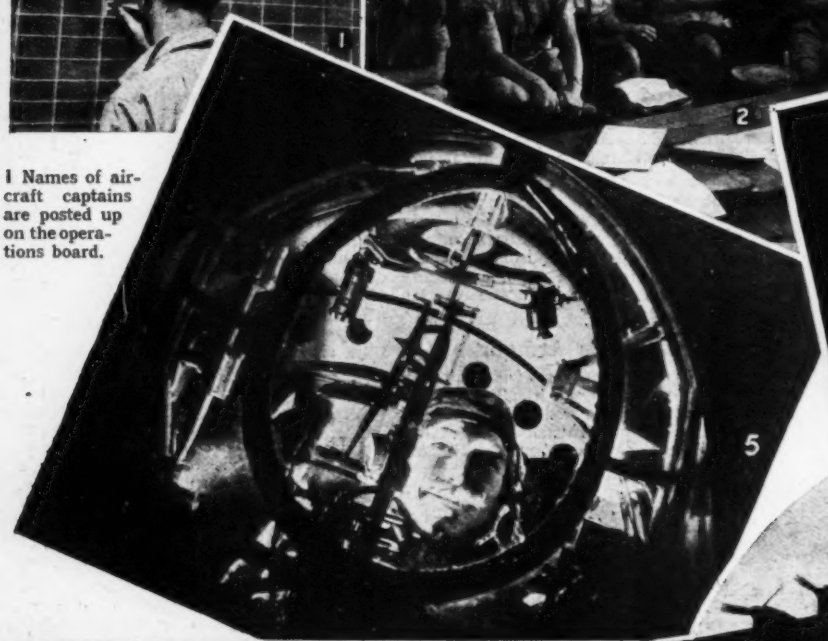
AMONG units of the *Regia* engaged in North Africa, special mention is made in the Italian Press of the Fourth Fighter Regiment. This unit, called the "Fourth *Stormo*," was formed in 1931; it is said to be composed of crack fighter pilots of the Italian Air Force, and credited with 500 (!?) victories.

CONTEMPLATION. General der Fliegen Foerster—who commands an air corps under General Keller—with his chief of staff. During the past and present winters this corps has suffered severely in operations on the northern sector of the Russian front.

The Night M

1 Names of aircraft captains are posted up on the operations board.

2 Comfortably clad in shirts and shorts the aircrews listen to the briefing in the afternoon.



5 The navigator-bomb aimer in the front compartment

6 Top protection. The air gunner in the mid-upper or dorsal turret.

8 The operations officer keeps in touch with the aircraft by radio telephone.

9 In the light of dawn. A Halifax returning after delivering the "Mail."

10 The squadron gunnery officer in the rear turret. The reflector sight can be seen just above his hand on the controls.

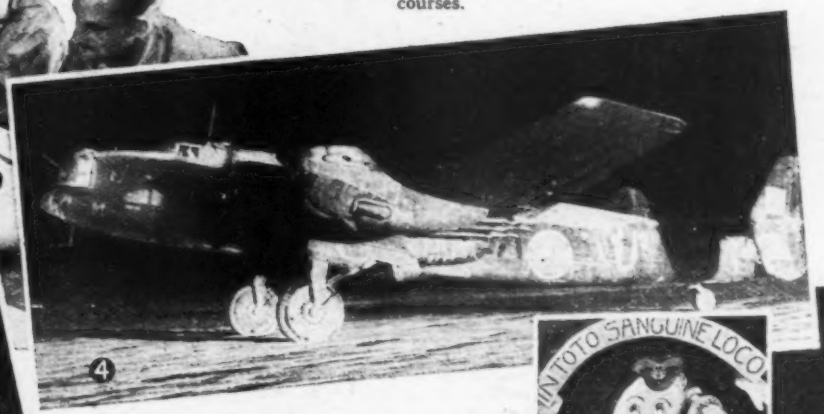
11 Telling the story of the raid to the intelligence officer.

12 A polite translation would read, "We operate almost anywhere."

ht Mail Run

How Handley Page Halifaxes Reduced the Axis Ports in Libya Before and During the Great Westward Advance

3 After briefing, the crews forgather and the navigators work out their courses.



4 Night scene in the desert. A Halifax ready to take off along the flare path.

7 Standing by the Chancelight the signaller gives a waiting Halifax the O.K. for take-off.

"LAST night allied bombers attacked Tobruk and Benghazi. Large fires and explosions were observed among dock installations and on quays." Until the recapture of these towns by the Eighth Army this announcement was made so regularly that it passed almost unnoticed. Behind these words lay one of the most persistent, powerful and vital air offensives against the Axis lines of supply in the Middle East. It was carried out by Halifax bombers. Every night, week in and week out, hundreds of men flew through the darkness over a distance of 1,100 miles to drop hundreds of tons of bombs. The men who flew on these raids called them the "Night Mail Run." The "Mail Run" whittled away shipping, dock machinery, stores and dislocated the organisation of enemy-occupied ports. They hit him hard behind the lines and confused his supply.

HERE AND THERE

New U.S. Carrier

A NEW aircraft carrier has just been launched in the United States; this is the one to be known as Cowpens, and the fourth carrier to be launched in five months at this shipyard.

Air/Sea Rescuers' Badge

A BADGE showing a launch at speed with the letters "A.S.R." embodied in the design is to be worn by airmen serving in launches in the Air/Sea Rescue Service.

Hurricanes for Turkey

IT is reported that a "new type" of Hurricane fighter is among the deliveries of British war material to Turkey. An increasing amount of material is now reaching this country under the treaty of alliance.

R.F.D. Appointment

MR. A. VAN BEUGEN BIK has been appointed managing director of R.F.D. Co., Ltd., aeronautical engineers, of Guildford and Godalming. Mr. Bik joined the board in May, 1939.

He has, since July last, during the late Mr. Dagnall's illness, acted as executive director.

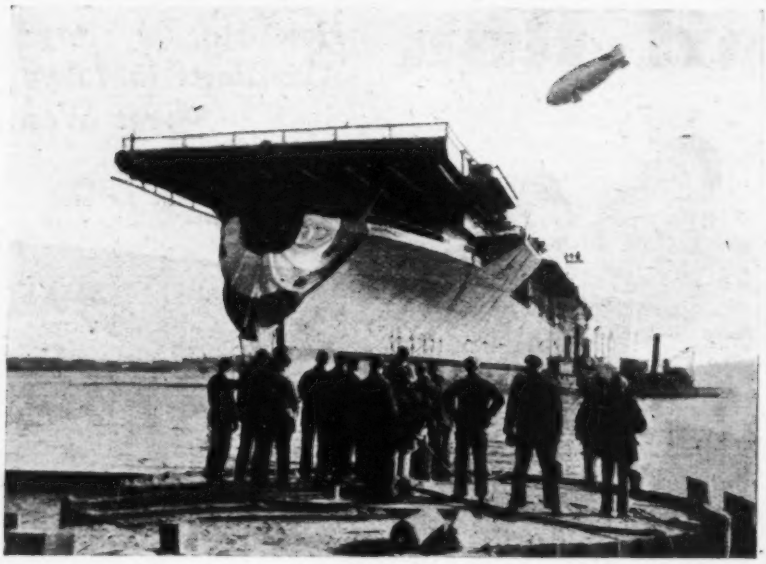
Vengeance on the Way!

VENGEANCE dive-bombers are now in service with the R.A.F., announced the Air Minister, Sir Archibald Sinclair, in the House of Commons.

These were ordered as long ago as July, 1940, but it was not until about a year later that the first one actually flew and was formally "christened" by Lady Halifax.

Sir Archibald explained that although the Air Ministry thought the dive-bomber was a highly desirable type to have, other types had been more urgently needed.

A brief description of the Vultee Vengeance will be found in the final instalment of "Aircraft of the Anglo-American Forces" elsewhere in this issue.



POTENTIAL RETRIBUTION: The 25,000 ton aircraft carrier, *Bunker Hill*, was launched on the first anniversary of Pearl Harbour, and is likely to play its part in due course in avenging that day. This picture was taken just after the launch, with a U.S. Navy blimp overhead.

Herman is So Cross!

THE *Luftwaffe* disgraced itself at El Alamein, according to Goering, who has issued an Order of the Day telling them of his disappointment at their lack of success, and saying their colleagues in Russia and on the Channel coast must be ashamed of the low standard of their performance in Africa.

Bomber units in Crete and fighter detachments in North Africa have received copies of the Order.

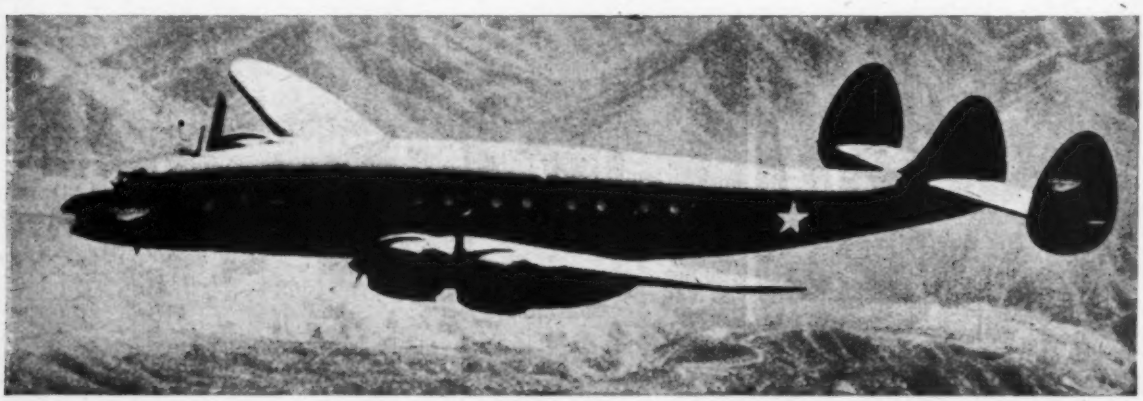
U.S.A. and Berlin

MAJ. GEN. CAMPBELL, Chief of the United States Ordnance, promised a Detroit Press conference that "when the weather becomes right, about April, the bombing of Berlin is going to be something." He expressed the belief that Italy will be out of the war in a few months, and the war itself would be over in about two years.

A.T.A. Benevolent Fund

HERE is the sixth list of subscriptions to the A.T.A. Benevolent Fund. Donations should be sent to Comdre. Pauline Gower, the fund's secretary, White Waltham, near Maidenhead, Berks.

	£	s.	d.
Subscriptions already acknowledged	5,234	9	5
Percival Aircraft, Ltd. ..	21	0	0
Messrs. Whitely Products, Ltd.	5	5	0
Lady Longmore	5	0	0
Anonymous	1	0	0
A. B. Logan	1	0	0
	£5,267	14	5



HEAVENLY BODIES: The Lockheed Constellation on its maiden flight from its Burbank birthplace to Murdoc dry lake. Powered by four 2,000 h.p. 18-cyl. Wright double-row Cyclones, this big transport is reported to have a top speed of more than 300 m.p.h., a ceiling of 35,000ft. and a range of more than 3,000 miles at 250 m.p.h. It can carry some 10 tons in freight.

Focke-Wulf 190A-3

Further Details of Germany's Best Fighter : Heavy Armament and High Rate of Climb

Concentrated equipment has resulted in very small overall size. A feature is the somewhat "bandy-legged" undercarriage of very wide track.

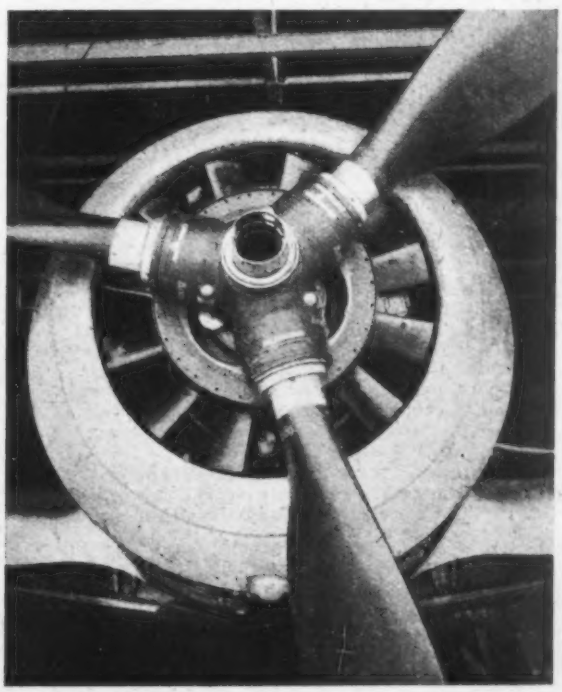
The cockpit cover of the Fw 190 is of the sliding type. In emergency it can be jettisoned by the firing of a cartridge. Normally it is operated by a hand-winding gear.

RECENT visitations have once more brought into prominence the Focke-Wulf Fw 190, Germany's latest and best single-seater fighter. Very full details of this interesting machine were published in our issues of August 13th and 27th, 1942, but some further facts about it may not be uninteresting.

For convenience it may be recalled that the Fw 190 was designed by Kurt Tank and built by the Focke-Wulf Aircraft Company, of Bremen. The chief characteristics of the machine are small size, low weight, and very compact, not to say cramped, stowage of all equipment. The engine is a two-row, 14-cyl. B.M.W. 801 D, radial air-cooled, which develops approximately 1,600 b.h.p. at 2,450 r.p.m. at 14,000ft.

Armament comprises four cannon and two machine guns. The latter are of the M.G.17 (7.92 mm.) type, and are mounted above the engine in front of the cockpit. The ammunition boxes are carried immediately below the machine guns, and the ammunition is heated through a hot-air duct from the engine.

The two Mauser M.G.151 guns (20 mm.) have been



Cooling of the B.M.W.801 engine is assisted, in the Fw 190, by a 12-bladed fan running at 3.143 times airscrew speed. On the left a view of the cockpit. A notice warns the pilot not to lower the undercarriage at speeds below 200 km./hr (125 m.p.h.), which indicates a dangerous change of trim at low speeds.

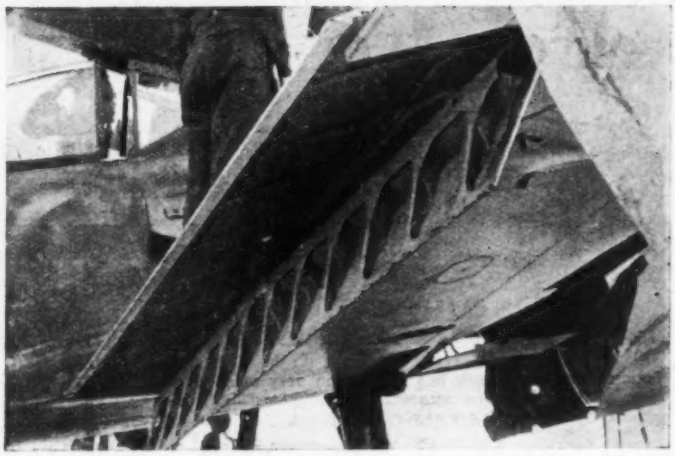
FOCKE-WULF 190 A-3

modified from the standard type so as to fire electrically detonated cartridges. These two cannon are mounted in the wing, just outside the fuselage, and are synchronised electrically to fire through the airscrew disc. The remaining two cannon (FF. Oerlikon-20 mm.) are carried in the wings, outboard of the undercarriage attachments.

Provision is made for carrying a 500 lb. bomb under the fuselage, or a long-range fuel tank (normally the machine carries but 115 gallons) can be fitted on the bomb carrier and jettisoned when desired.

With a wing span of only 34ft. 6in. and a mean chord of 5.9ft., the gross wing area is 203 sq. ft. As the loaded weight is 8,580 lb., the wing loading is 42.3 lb./sq. ft. The power loading (based on 1,600 b.h.p.) is 5.36 lb./h.p.

The speed is not remarkably high, being approximately 326 m.p.h. with the supercharger in low gear at 4,500ft., and about 375 m.p.h. at 18,000ft. with the supercharger in high gear. The Fw 190 has a very good rate of climb—3,050 ft./min. at 4,000ft. and 3,280 ft./min. at 17,500ft. It is this high rate of climb, coupled with the excellent manœuvrability due to small size and low moments of inertia, which is its chief merit.



The split flaps are made from three pressings riveted together with upturned edges so that the leading edge forms a box. They are operated by screw jacks, and a notice in the cockpit states that they are not to be lowered at speeds above 295 km./hr. (185 m.p.h.).

Weight Analysis

Mention has been made of the fact that the normal loaded weight of the Fw 190 is 8,580 lb. The following summary shows how this weight is made up:—

	lb.
Weight with all fixed equipment except guns	6,544
Pilot and parachute	200
Fuel (115 gallons)	860
Oil (10 gallons)	96
Two M.G.151 cannon	196
Ammunition (2×200 rounds)	200
Two M.G. FF. cannon	126
Ammunition (2×55 rounds, and magazines)	90
Two M.G.17 machine-guns	56
Ammunition (2×1,000 rounds)	142
Radio equipment	70
All-up weight lb.	8,580

The following wing details may be of interest: The span, as already mentioned, is 34ft. 6in. and the mean chord 5.9ft., giving a gross wing area of 203 sq. ft. The net wing area is 177 sq. ft. Aspect ratio (span²: area) = 5.87. The wing chord at the root is 7.5ft. and at the tip 4.05ft.

Wing flaps of the split type are fitted. Their area is 9.2 per cent. of the wing area. At the inner end the flap chord is 16 per cent. of the local wing chord and at the outer end 21 per cent. The maximum flap angle is 60 deg.

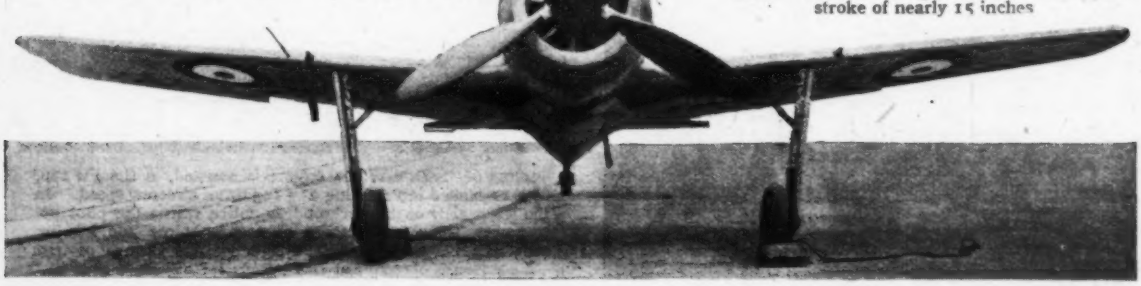
The ailerons of the Fw 190 are of the Bristol-Frise type and their total area is 20.1 sq. ft., or 9.9 per cent. of the total wing area, and the aileron span 43 per cent. of the wing span. The aileron angles are 17 deg. each way.

Horizontal tail surfaces of the Fw 190 total 31.6 sq. ft., of which 38 per cent. is elevator area. The elevator has shielded horn type of balances, and the angular movement is 26 deg. down and 31 deg. up. The tail volume coefficient is 0.45.

The gross fin and rudder area is 24.3 sq. ft., of which 31.5 per cent. is rudder area. The maximum rudder angle is 16 deg. each way, and the rudder balance is of the shielded horn type. The fin and rudder coefficient is 0.134.

Good, But Not Quite Good Enough

It would be idle to pretend that the Focke-Wulf Fw 190 is not a worthy opponent, but recent events have confirmed the view previously held that it is not a match for our latest types of fighter. For a time it scored in certain respects at its own particular operational height, but at low levels we have several types which are faster, and at medium and high levels it has been tackled successfully by such fighters as the Spitfire IX and the Typhoon. The former, it will be recalled, is an improved version with Rolls-Royce Merlin 61 liquid-cooled engine, having a two-speed, two-stage supercharger. The Typhoon can be regarded as the successor to the Hurricane and is driven by the Napier Sabre 24-cyl., sleeve-valve, H-type engine, which is in the 2,000 h.p. class. Nevertheless, there are features of the Fw 190 which merit close study, particularly in the matter of engine installation. The close cowling and the fan-assisted air flow directed by cylinder and head baffles show considerable ingenuity.



When seen from in front the Fw 190 gives a good impression of its small size. A notable feature in this view is the very wide wheel track. The oleo legs have a maximum stroke of nearly 15 inches

Aircraft of the Anglo-American Forces

Review of British and U.S. Types in Operational Service

THIS is the fourth and last instalment of an alphabetical list of 69 different types of Service aircraft of British and American manufacture, 56 of which have been dealt with in the three preceding issues of "Flight."

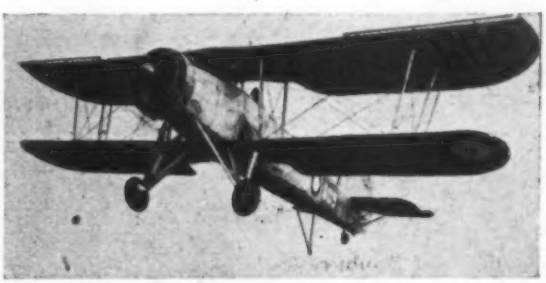
MOSQUITO

DE HAVILLAND AIRCRAFT CO., LTD., Gt. Britain. Light reconnaissance-bomber in service with the R.A.F. Powered by two Rolls-Royce Merlin XXI liquid-cooled 12-cylinder "V" type engines, the Mosquito is of wooden construction, and its simple design lends itself to widely dispersed manufacture. It is, incidentally, the first operational type to be developed by de Havilland since the last war, but it has gone right into the front rank; it is probably the fastest aircraft of its type in existence, and its armament may consist of four 20 mm. cannon and four 0.303in. machine-guns. The daylight raid on the Nazi H.Q. at Oslo earned the Mosquito its first official mention. No performance figures have yet been released. Dimensions: Span 54ft. 2in., length 40ft. 9in., height 15ft. 3in., wing area 420 sq. ft.

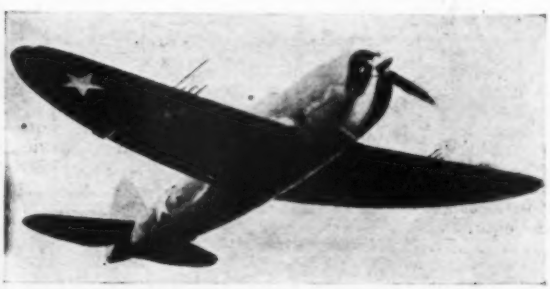
SUNDERLAND

SHORT BROS., Gt. Britain. Four-engined, long-range patrol flying-boat in service with the Coastal Command of the R.A.F., to whom it was first delivered in 1938. A development of the Empire "C" class commercial flying-boat, the hull is very roomy and the four Bristol Pegasus XXII nine-cylinder, air-cooled radial engines, each rated at 840 h.p. at 2,250 r.p.m. at 4,000ft., give it a top speed of 210 m.p.h., and a cruising speed of 178 m.p.h. More powerful Bristol engines are fitted to recent versions, giving even better performance figures. Service ceiling is 20,500ft., and normal cruising range 1,780 miles, but an overload range of 2,900 miles is possible. Dimensions: Span 112ft. 9in., length 85ft. 4in., height 32ft. 10in., wing area 1,487 sq. ft.

SWORDFISH



FAIREY AVIATION CO., LTD., Gt. Britain. Two-three seater torpedo-spotter-reconnaissance biplane still in service with the Fleet Air Arm. Affectionately known as the "Stringbag," this aircraft is one of the old faithfuls of the Service. Powered by a 690 h.p. Bristol Pegasus III.M3 type nine-cylinder, air-cooled radial engine, it exists both as a landplane with fixed undercarriage and as a floatplane, the former, which is the more common form, having a top speed of 154 m.p.h., a cruising speed of 131 m.p.h., a service ceiling of 19,250ft. and a duration of 5.7 hr. It can carry one 18in. torpedo beneath the fuselage and small bombs beneath the lower wings. Dimensions: 45ft. 6in., length 36ft. 4in., height 12ft. 10in.



THUNDERBOLT

REPUBLIC AVIATION CORP., U.S.A. Single-seater fighter in service with the U.S. Army Air Force under the designation P-47B. Powered by a Pratt and Whitney Double Wasp, 18-cylinder, air-cooled, radial engine of 2,000 h.p., it is credited with a top speed in excess of 400 m.p.h., although no official performance figures have as yet been issued for publication. An exhaust-driven turbo-supercharger gives it a ceiling of more than 40,000ft., and a four bladed airscrew is used. One of the biggest single-seater fighters ever built, it is, in fact, a development of the much smaller Lancer, and R.A.F. pilots in America who have flown it speak extremely well of its nice handling, comparing it with the best British types. Dimensions: Span 41ft., length 32ft. 8in., height 13ft.

AIRCRAFT OF THE ANGLO-AMERICAN FORCES

TOMAHAWK

CURTISS-WRIGHT CORP., U.S.A. Single-seater fighter in service with the R.A.F. and the U.S. Army Air Force as the P-40. Powered by an Allison V-1710-C15 engine of 1,150 h.p., the Tomahawk has done much useful service in the Middle East, though it is now being superseded by later versions in the form of the Kittyhawk and Warhawk, the last named being the P-40F. It also equipped the famous American squadron known as the Flying Tigers, who fought the Japs in Burma. All-metal construction with smooth Alclad skin is used, and top speed is 335 m.p.h. at 15,000ft., service ceiling 35,000ft., and cruising range at 315 m.p.h., 945 miles. Dimensions: Span 37ft. 3½in., length 31ft. 8in.; height 10ft. 7in., wing area 236 sq. ft.

VENGEANCE

VULTEE AIRCRAFT INC., U.S.A. Two-seater dive-bomber ordered for the R.A.F. as long ago as July, 1940. Other types were more urgently needed, however. Towards the end of 1941 one heard the Vengeance was in production for the R.A.F., and, more recently, that it was to be our standard dive-bomber, and an official report of the type actually in service has just been issued. Powered by a Wright Double Cyclone 18-cylinder, air-cooled, radial engine of 1,600 h.p., the Vengeance is reputed to have a top speed of just over 300 m.p.h. and to carry a 1,700 lb. bomb-load internally stowed. Dive brakes are fitted under the outer-panels of the wings, which have a sharply backswept centre-section. Dimensions: Span 48ft., length 40ft., height 12ft. 10in.

VENTURA

LOCKHEED AIRCRAFT CORP., U.S.A. Reconnaissance-bomber in service with the R.A.F. First mentioned in connection with the daylight raid on the Philips radio factory at Eindhoven, Holland, the Ventura is a development of the Lodestar civil type. It is powered by two Pratt and Whitney 18-cylinder Twin-Wasp engines, each developing 2,000 h.p. Although structurally similar to the Lodestar, its fuselage is some 7ft. 6in. longer. Very similar in appearance to the Hudson, it may be distinguished from its worthy predecessor by the gun position almost under the tail and the 'midships position of the dorsal turret. No performance figures may be published. Dimensions: Span 65ft. 6in., length 57ft. 6in., wing area 551 sq. ft.

VIGILANT

STINSON Division of the Vultee Aircraft Inc., U.S.A. Two-seater army co-operation high-wing monoplane in service with the R.A.F. and the U.S. Army Air Force as the O-49. Army manœuvres among the swamps of Louisiana showed them that the light two-seater aircraft of a type very popular with private owners could be extremely useful for swift communications where road travel was difficult and the U.S. Army ordered a number of such machines. The Vultee Vigilant was built to the official specification for a short-range type for contact work with the infantry. Later it was also ordered for the R.A.F. for similar duties. Power is by a 285 h.p. Lycoming radial engine and top speed is 133 m.p.h. Dimensions: Span 59ft. 11in., length 33ft. 6½in., height 9ft. 10in.

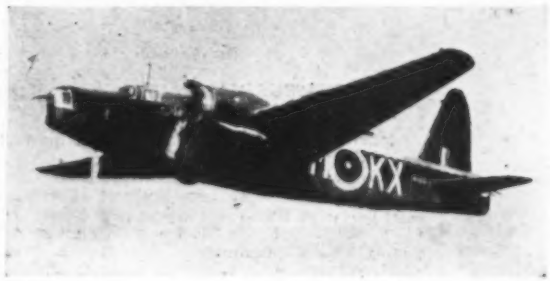
WARHAWK

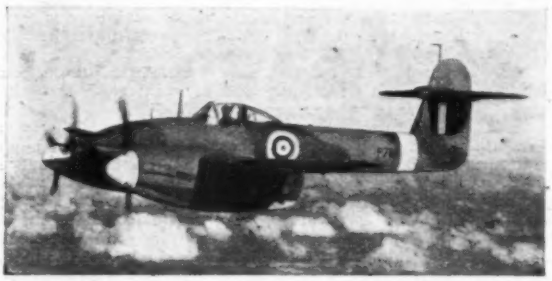
CURTISS-WRIGHT CORP., U.S.A. Single-seater fighter in service with the R.A.F. and with the U.S. Army Air Force as the P-40F. This is the latest of the P-40 series. Its chief difference from its predecessors is that it is powered by a Rolls-Royce Merlin engine manufactured in America by the Packard Motor Co. In all other respects it is the same but, as in the case also of the Tomahawk and Kittyhawk, the armament of the American model differs from that of the R.A.F. version, as do certain other items of equipment, such as radio fittings. Performance figures for the Warhawk are not available for publication, but the greater power of the Merlin over the Allison will have vastly improved them. Dimensions: Span 37ft. 3½in., length 31ft. 9in., height 10ft. 9in., wing area 236 sq. ft.

AIRCRAFT OF THE ANGLO-AMERICAN FORCES

WELLINGTON

VICKERS-ARMSTRONGS, LTD. Twin-engined, long-range bomber in service with the R.A.F. Notable for its geodetic construction which gives great strength. Early Wellingtons were powered by 1,000 h.p. Bristol Pegasus XVIII engines. Then came the 1,145 h.p. Merlin-engined model (Mk. II), and then the Wellington III with 1,370 h.p. Bristol Hercules radial engines. Power-operated gun-turrets in nose and tail comprise its defensive armament. Top speed of the Wellington Ic is 250 m.p.h. at 15,500ft., service ceiling 24,000ft., and maximum range over 3,000 miles. The Mark II is about 20 m.p.h. faster, and the Hercules-engined Mark III faster still. Dimensions: Span 86ft. 2in., length 64ft. 7in., height 17ft. 5in., wing area 840 sq. ft.



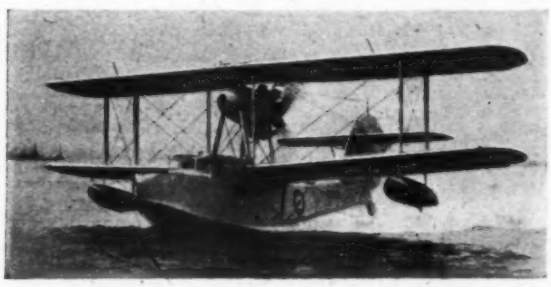


WHIRLWIND

WESTLAND AIRCRAFT, LTD., Gt. Britain. Single-seater twin-engined fighter in service with the R.A.F. Powered by a pair of 885 h.p. Rolls-Royce Peregrine engines with radiators buried in the centre-section each side of the slim fuselage. Four 20 mm. cannon are mounted in the nose, and last September came the first intimation that the type had also been fitted with light bomb-racks under the wings and was in use as a fighter-bomber, escorted by Spitfires. Performance figures have not been officially released, but German sources some time ago gave it a top speed of 353 m.p.h. at 16,350ft. Its most prominent feature is the mounting of the tailplane near the top of the tall single fin. Dimensions: Span 45ft., length 31ft. 6in., height 11ft. 6in.

WHITLEY

SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT, LTD., Gt. Britain. Twin-engined heavy bomber. The oldest type of bomber in current use, the Whitley is still in service with Coastal Command of the R.A.F., and a number have also been converted into transports by the removal of the gun-turrets from the nose and tail. Originally fitted with two Armstrong Whitworth Tiger, air-cooled radial engines, the Whitley was later powered by Rolls-Royce Merlin X liquid-cooled 12-cylinder "V" type engines of 1,010 h.p. Bombs carried internally in the belly and in the wings. Top speed of the Whitley V is 230 m.p.h., cruising speed 210 m.p.h., service ceiling 26,000ft., and maximum range 2,200 miles. Dimensions: Span 84ft., length 70ft. 6in., height 15ft., wing area 1,137 sq. ft.



WALRUS

VICKERS-ARMSTRONGS, LTD., Gt. Britain. Fleet spotter amphibian in service with the Fleet Air Arm and the Air/Sea Rescue Service. Powered by one Bristol Pegasus VI nine-cylinder, air-cooled radial engine with pusher airscrew. The power-egg is mounted between the wings on the centre-section struts, and the flat-sided, single-step hull carries the land wheels which retract into the under-surface of the lower wings. Gun positions are provided in the prow and aft of the backswept, single-bay wings. A sea-rudder is provided with the tail-skid. Top speed 135 m.p.h. at 4,750ft., cruising speed 95 m.p.h., service ceiling 18,500ft., cruising range 600 miles. Dimensions: Span 45ft. 10in., length 37ft. 7in., height 15ft. 3in., wing area 610 sq. ft.

AIRCRAFT RECOGNITION CHARTS

THE *Flight* Recognition Charts of British, American and German aircraft have again been modernised, and the new editions, printed on cards for hanging, and measuring approximately 21½×14½in., are now ready. The main illustrations present a general aspect of the aircraft depicted, supported by line drawings depicting head-on, broadside, overhead and underside views, with the principal recognition characteristics in the adjacent text. Each chart costs 1s. 3d. net, with postage 6d. extra for single copies, 7d. up to three copies, and 8d. up to six copies.

The same set of three charts, but printed on paper, each chart measuring 29×19in., i.e., larger than the card charts, encased in an envelope, can also be obtained at a cost of 2s. for the set, or 2s. 2d. by post.

All the charts are obtainable from Dorset House, Stamford Street, London, S.E.1, or can be ordered through newsagents and booksellers.

SOUND-TRACK MUSIC FOR R.C.A.F.

MECHANISED band music is the latest product of the machine age to be employed by the Royal Canadian Air Force.

Through the use of a mobile sound unit mounted on a track, the R.C.A.F. now can bring the music of crack bands to wing parades, route marches and drill exercises on any station.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

BOOST PRESSURE VARIATION

Type of Airscrew Blade a Factor

I NOTICE that much controversy has arisen over the question put by "Puzzled" in the November 19th, 1942, issue.

The explanation is really very simple, although a good working knowledge of the Rolls Royce boost control and also a diagram would be necessary to explain it properly.

Briefly, it is this: the Rolls Royce boost unit does not correct for throttle opening until approximately +2lb./sq. in. boost pressure is reached, as pressure under this amount is insufficient to raise the boost aneroid piston valve to the point where it allows boost pressure to act on the front side of the relay piston, forcing the latter rearwards and correcting the throttle opening.

In other words, throttle openings below +2lb./sq. in. boost are manual. Therefore, running at olb./sq. in. boost, any variation in air-intake pressure will register on the boost gauge.

The act of placing the airscrew in coarse pitch, although it decreases the r.p.m., gives a greater ramming effect on the air intakes which increases the intake pressure and registers on the gauge as an increase in boost pressure.

This increase will vary with the type of airscrew fitted, a wide blade giving a greater increase than a narrow blade.

The drop in r.p.m. of the supercharger and resultant drop in manifold pressure from this source is more than compensated by the extra ramming effect gained by the coarsened pitch of the airscrew.

A. M. STEPHENS.

POST-WAR AIR TRAFFIC

Scope of Anglo-American Negotiations

BRITAIN'S air strength to-day may be her weakness when the war ends. Having concentrated, as was right and necessary, on building fighting aircraft during the past three years, Britain is very ill provided with 'planes that can transport passengers in comfort and freight in quantity. The United States, alone among the Allies, is still operating and building large numbers of air-liners.

It is true that most of the new construction is reserved for military needs—for example, the ferry routes to Europe, South America, China and Australia—but the 'planes which are now carrying military personnel and special freight could be transferred to serve civil aviation's needs almost overnight. It is all the more necessary, therefore, that some kind of understanding between Britain and the United States should be reached now on the general pattern of post-war civil aviation.

Fortunately, there are indications that negotiations will begin shortly, if, indeed, they have not already begun, with the United States taking the initiative. Reports from Washington suggest that America is specially interested in three questions—"the right of innocent passage," the "right of free landing," and the principle of "freedom of the air."

The first covers aerial passage over any country by non-military aircraft provided domestic regulations governing the country's own commercial aircraft are observed. "Right of free landing" implies freedom to land anywhere for refuelling or for technical reasons, provided, again, that domestic regulations are obeyed and that passengers are neither landed nor picked up.

"Freedom of the air" means, according to this American view, that any country can license commercial air traffic between that country and any other country, or between two or more foreign countries, but there shall be no "intra-national" commerce, such as a British 'plane flying to New York and picking up passengers there before continuing its flight to, say, Chicago.

The fact that such matters are now claiming attention is at least a reminder to the Government and people of Britain that post-war civil aviation will be of a scope and ubiquity to which nothing in pre-war days offered a parallel.

It should also stimulate the Government to implement the bold but vague promises made by the Under-Secretary for Air in the recent debate on civil aviation.

J. C. LUMSDEN.

[In British circles there appears to be growing a conviction that there must be "Freedom of the Air." Our great problem will be that of getting into service quickly the new aircraft needed to take advantage of it.—ED.]

UNNECESSARY SECRECY

The Other Side of the Picture

YOUR correspondent Mr. G. S. Henderson in his letter in *Flight* of January 7th complains of restrictions in releasing information about new types. While I am not entirely in agreement with the official attitude in this respect, I can appreciate some of the finer points which Mr. Henderson appears to miss.

A main point to remember is that, whether we like it or not, once a new type is in service in any numbers it is impossible to prevent information about it spreading, and I am sure no Government department would attempt to deny that statement.

A large number of people, both civilians and Service personnel, will come in contact with the new aircraft, and hearsay will inevitably filter out through various channels.

What is equally important to note is that this information can never be taken as reliable and may therefore lead the unwelcome enthusiast "up the garden path."

Whether or not photographs would be of use to the enemy is a debatable point. But a good photograph shows a lot more than most models, and at the same time is not liable to produce the queer effects seen on some models.

Many readers praise this journal for a high standard of accuracy. If that is the case, anything found therein can be accepted as being true. Therefore anything published could and would be snapped up by the enemy as being "pukka gen."

It is consequently apparent that, as long as no reliable journal comments on or illustrates new types, the enemy is still in the dark, and until he captures sufficient crashed aircraft he has largely nothing but rumour to work upon.

That *Flight* sees the force of this argument is evident. It is at liberty at any time to publish photographs of a machine if it thought a real harm was being done by remaining silent. In view of the occurrence of such incidents as have been mentioned, it could hardly be called to question by the Censor.

Furthermore, Mr. Henderson cannot be justified in complaining of lack of information of new types when it comes to recognised spotters—i.e., the Services, R.O.C., and official spotter clubs. These are all supplied with the latest information, and if Ack-Ack gunners fire at friendly aircraft (which is nothing new), it is more likely to be their lack of enthusiasm for recognition than any scarcity of material.

Edinburgh. "LEO."

FAULTY FILMS

Examples from "Dive Bomber"

FOLLOWING up the discussion on faulty films I would like to draw attention to a few howlers in a new production—"Dive Bomber."

A pilot takes up a high-altitude machine to test the pressure cabin with which it is fitted, but when reaching 35,000 feet the pilot loses consciousness and the plane goes into a spin. A doctor who accompanies the pilot is tossed about the fuselage like a feather in a breeze. When the plane reaches 5,000 feet, however, he manages to reach the controls and level the plane off, the pilot still being comfortably seated at his controls, and yet no straps are attached to his seat!

Later, a pilot takes up an American machine to a high altitude. He also loses consciousness, the plane goes into a dive, and after dropping a few thousand feet the machine changes to a Gloster Gladiator, the R.A.F. roundels being clearly shown. Then from the airfield you see the plane hurtling earthwards not much above 3,000 feet. Then the film takes you to the pilot's position, the height indicator records 10,000 feet and the airfield is nowhere in sight. To finish the film, a ferry pilot lands with an R.A.F. fighter—the "fighter" being a Ryan trainer, with radial engine, fixed undercarriage and an open cockpit—an absolutely ridiculous makeshift!

These films are produced, I believe, to show the public the perils of aerial research and the sublime courage with which British and American aircrews tackle the problems; but if these childish mistakes are not rectified, people will be going to see aerial films just for the sake of a good laugh.

J. HOWE.

Service Aviation

The Ile de France Squadron of Fighter Command take off their Spitfires into a setting sun.

Royal Air Force and Fleet Air Arm News and Announcements

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following awards:—
For gallantry and skill in flying operations in the Middle East.

DISTINGUISHED SERVICE CROSS.

Temp. Sub. Lt. (A.) F. B. COOPER, R.N.V.R.
Temp. Sub. Lt. (A.) O. S. E. LLOYD, R.N.V.R.
Temp. Sub. Lt. (A.) W. B. ORWIN, R.N.V.R.
Temp. Sub. Lt. (A.) L. WILKINS, R.N.V.R.

DISTINGUISHED SERVICE MEDAL.

Act. P.O. (Air) J. D. MACKENZIE.
Ldg. Airman A. S. HARPER.

MENTION IN DESPATCHES.

Temp. Lt. (A.) G. F. ARNOLD, R.N.V.R.

Royal Air Force

Eindhoven Raid

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:

On December 6th, 1942, a force of bombers was detailed to make an attack in daylight on the Philips factory at Eindhoven. The operation, which was executed faultlessly, demanded a high degree of skill and accurate timing. Bombs were released at varying heights, down to roof top level. Many hits were obtained, some in the centre of the target area. Two gun posts were silenced. Intense and heavy opposition was encountered, and both on the outward and return flights attacks were made by enemy fighters. The great success achieved reflects the greatest credit on the following personnel, who participated in various capacities as leaders and members of aircraft crews:—

DISTINGUISHED SERVICE ORDER.

Wing Cdr. H. I. EDWARDS, V.C., D.F.C., No. 105 Sqn.
Wing Cdr. J. E. PELLY-FRY, R.A.F.O., No. 88 Sqn.
Wing Cdr. R. H. YOUNG, A.F.C., No 464 Sqn.

DISTINGUISHED FLYING CROSS.

Wing Cdr. R. J. P. PRICHARD, A.F.C., No. 21 Sqn.
Sqn. Ldr. R. J. N. MACLACHLAN, No. 107 Sqn.
Act. Sqn. Ldr. J. F. HOULSTON, A.F.C., No. 139 Sqn. (since reported missing).
Flt. Lt. E. F. HART, No. 464 Sqn.
Act. Flt. Lt. T. H. J. CAIRNS, D.F.M., No. 88 Sqn.
P/O. H. H. E. P. CAIRNS, No. 105 Sqn.
P/O. C. A. EVANS, D.F.M., R.A.F.V.R., No. 88 Sqn.
P/O. J. M. RANKIN, R.A.F.V.R., No. 107 Sqn.

DISTINGUISHED FLYING MEDAL.

Flt. Sgt. G. E. T. NICHOLS, No. 107 Sqn.
Sgt. W. H. C. LEAVITT, R.C.A.F., No. 226 Sqn.

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy:—

DISTINGUISHED SERVICE ORDER.

Act. Wing Cdr. D. PEVELER, D.F.C.—In December, 1942, Wing Cdr. Peveler and P/O. Stewart were captain and rear gunner respectively of an aircraft engaged in a search for the crew of an aircraft lost at sea. When leaving the area after searching for 12 hours, three Ju 88s attacked their aircraft. P/O. Stewart gave a splendid running commentary on the movement of the enemy aircraft which enabled his captain to take evasive action. Wing Cdr. Peveler manœuvred his aircraft with superb skill and determination until safety was gained in the clouds, but the bomber had been damaged and the second pilot and bomb aimer wounded. Some time later a further attack was made by three F.W. 190s. In the ensuing combat, despite the heavy odds, P/O. Stewart, by his accurate shooting, shot down one of the fighters and damaged another, while the third was driven off. Displaying magnificent airmanship, Wing Cdr. Peveler flew his badly damaged aircraft safely back to this country. P/O. Stewart's coolness and gallantry very materially assisted his captain throughout this hazardous operation.

Sqn. Ldr. T. M. Bulloch, D.F.C., No. 120 Squadron, who was awarded the D.S.O. for . . . . "a number of successful sorties against submarines."

BAR TO DISTINGUISHED FLYING CROSS.

Act. Sqn. Ldr. H. T. ARMSTRONG, D.F.C., R.A.A.F., No. 611 Sqn.—Since being awarded the D.F.C., Sqn. Ldr. Armstrong has participated in many sorties over enemy occupied territory during which he has destroyed a further four enemy fighters and probably destroyed others. His great powers of leadership have contributed largely to the successes achieved by his squadron.

Wing Cdr. B. V. ROBINSON, D.S.O., D.F.C., No. 35 Sqn.—One night in November, 1942, during an operational sortie against Turin, this officer displayed great gallantry and determination when a dangerous fire broke out in his aircraft. Owing to the intensity of the flames and smoke which filled the cockpit, Wing Cdr. Robinson saw no hope of bringing the fire under control, and therefore ordered his crew to abandon the aircraft. While preparing to follow them himself, the fire abated. Undeterred by the difficulty of the flight, which involved crossing the Alps and flying many hundreds of miles over enemy occupied territory, Wing Cdr. Robinson continued alone, completed the return journey, and landed his large four-engined aircraft successfully in this country despite very adverse weather, accomplishing a most praiseworthy and skilful feat of airmanship.

DISTINGUISHED FLYING CROSS.

P/O. H. W. J. STEWART, R.C.A.F.—For citation, see Wing Cdr. Peveler, D.F.C.

Sqn. Ldr. The Hon. B. GRIMSTON, R.A.F.V.R., No. 156 Sqn.—Sqn. Ldr. Grimston was captain of an aircraft engaged in operations against Turin on the night of December 11th, 1942. Throughout the greater part of the outward flight, he was forced to fly blind, owing to extremely adverse weather. Only by exercise of the greatest coolness and tenacity was this officer able to surmount the difficulties of the Alpine crossing, reach the target, and complete his mission. On the return flight, the state of the weather exacted the most superlative airmanship and navigational skill. Sqn. Ldr. Grimston finally made a successful landing in this country.

P/O. E. B. COZENS, R.C.A.F., No. 218 Sqn.—P/O. Cozens has participated in a large number of operational sorties. One night in December, 1942, he was captain of an aircraft detailed to

SERVICE AVIATION

attack a target in North-West Germany. When approaching the objective his aircraft was held in a cone of searchlights and badly damaged by anti-aircraft fire. Despite this, P/O. Cozens, displaying great determination, flew on and bombed the target from a very low level. On the return journey the bomber was again hit by anti-aircraft fire and the starboard inner engine caught alight. Descending to 100 feet, a fuel tank was jettisoned, and the fire extinguished. P/O. Cozens then flew his aircraft safely back to base.

F/O. P. G. FREBERG, R.C.A.F., No. 7 Sqn.—This officer, as navigator, has participated in a number of operational sorties during which he has displayed great determination and a high standard of courage and tenacity.

DISTINGUISHED FLYING MEDAL.

Sgt. T. NIX, No. 460 (R.A.A.F.) Sqn.—Sgt. Nix is a wireless operator of high merit. He has always displayed great keenness, and has rendered valuable service.

Sgt. P. MALONEY, No. 49 Sqn.—Sgt. Maloney has taken part in many operational sorties as wireless operator. On one occasion, when returning from a raid on Germany, he remained with his captain after the crew had baled out in order to assist him in an emergency landing. He performed his duties coolly and correctly, but soon after reaching the coast the aircraft crashed.

Sgt. (now P/O.) A. NUTT, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.—As wireless operator/air-gunner, Sgt Nutt has rendered excellent service. He has taken part in attacks on a wide range of targets, including Berlin, industrial centres in the Ruhr, and on the battleships *Scharnhorst* and *Gneisenau* in the Channel.

Sgt. E. R. SMITH, No. 102 Sqn.—This airman has served as wireless operator/air-gunner and as an air bomber, proving himself to be exceptionally able in both roles. He has taken part in attacks on many of the enemy's heavily defended targets, including Berlin, Duisburg, Wilhelmshaven, Kiel and Cologne.

Sgt. E. L. TRENDELL, No. 420 (R.C.A.F.) Sqn.—Sgt. Trendell has completed his sorties with courage and determination. He is a highly reliable wireless operator. On one occasion when the pilot was wounded and one engine was set on fire by anti-aircraft fire, he was largely responsible for enabling his captain to fly the damaged aircraft back to this country. He has participated in many attacks on industrial targets and in several mine-laying missions.

Sgt. W. T. UPTON, No. 61 Sqn.—Sgt. Upton has taken part in many operational sorties as wireless operator/air-gunner. He was member of a crew which made a successful attack on a U-boat in the Bay of Biscay.

Sgt. C. A. L. WALTON, No. 102 Sqn.—Sgt. Walton has flown on a number of sorties as air-gunner and many others as air-bomber. He has taken part in attacks on targets in the heavily defended Ruhr area.

Sgt. H. H. WRIGHT, No. 15 Sqn.—This airman is a rear gunner. He has participated in attacks on Bremen, Emden, Duisberg, Dusseldorf and Cologne.

Sgt. D. P. OLIVER, No. 103 Sqn.—One night in December, 1942, this airman was the rear gunner of an aircraft detailed to attack Frankfurt. When nearing the target area, the aircraft was intercepted by two enemy fighters. One of them attacked from the rear, but with great presence of mind, Sgt. Oliver directed his pilot's evasive tactics and six attacks were frustrated. On the return flight another enemy fighter attempted to attack, but Sgt. Oliver delivered a telling burst of fire from close range, causing the enemy aircraft to lose height rapidly with flames issuing from it.

Sgt. T. J. MCLEAN, No. 102 Sqn.

Sgt. R. F. LILLYWHITE, No. 102 Sqn.

One night in December, 1942, Sgts. McLean and Lillywhite were mid-upper and rear gunner respectively of an aircraft detailed to attack Mannheim. During the attack the aircraft was intercepted by a Ju 88. Slight damage was sustained but accurate return fire by Sgts. McLean and Lillywhite caused the enemy aircraft to break away. It flew in again, however, but both gunners met it with devastating fire, causing it to dive earthwards in flames. Almost immediately two more enemy aircraft made a simultaneous attack. Accurate fire from Sgts. McLean and Lillywhite frustrated the attack and one of the fighters was shot down.

THE KING has been graciously pleased to approve the following awards:—

M.B.E. (MIL.).

Flt. Lt. T. H. CULLEN, M.R.C.S., L.R.C.P., R.A.F.V.R., No. 30 Sqn.—A few days before the German invasion of Crete, this medical officer fell sick with dysentery at Maleme. When the heavy air attack on Maleme began, although too weak to walk properly, he attended to the wounded, and continued to do so under fire until his post was captured. Flt. Lt. Cullen then established a first aid post in a village near by and worked alone and without sleep for three days, after which he was joined by two doctors of the New Zealand forces. Over 1,000 wounded were passed through this medical post before it was finally taken over by an Australian Field Ambulance.

GEORGE MEDAL.

Flt. Sgt. R. de fontenay JENNER, R.C.A.F., No. 7 Sqn.—One night in September, 1942, Flt. Sgt. Jenner was a member of the crew of an aircraft detailed to attack a target at Dusseldorf. The target was bombed successfully, but, whilst still over the objective, the aircraft was repeatedly hit by anti-aircraft fire. The port inner propeller came off and, shortly afterwards, the port outer engine fell out, and the petrol tanks were holed in many places. During the return journey the crew displayed coolness and skill, doing all they could to keep the crippled bomber in the air. Shortly after crossing the English coast the aircraft crashed in a field and immediately caught fire. All the crew, with the exception of the rear gunner, managed to extricate themselves. The whole aircraft was soon blazing fiercely. Knowing that the fuel tanks might explode at any moment, two sergeants re-entered the aircraft in an attempt to rescue the rear gunner. They went forward to reach the place where they thought he would have been thrown, but a petrol tank exploded and both were killed. Flt. Sgt. Jenner, who had seen his two comrades killed and knew that a further petrol tank might explode, then re-entered the burning fuselage. He found the rear gunner, who was severely burned, and succeeded in removing him to safety.

Sgt. G. L. HOSFORD, No. 104 Sqn.—Sgt. Hosford was in charge of a party which laid a flare path and loaded bombs on to a squadron of aircraft one night in June, 1942. The bombers had taken off from a landing ground near by, and soon afterwards enemy aircraft began to drop flares and bombs in the neighbourhood. The attack continued throughout the night. At 23.00 hours our bombers returned to the airfield, to be refuelled and reloaded for a second sortie. One of the aircraft, when taking off on its second operation, received a direct hit by an enemy bomb; a terrific explosion occurred, and the aircraft burst into flames. Three members of the crew escaped through the pilot's escape hatch whilst the rear gunner, who was badly injured but had managed to free himself from his turret, was assisted by Sgt. Hosford to get clear of the aircraft. The bombs on the aircraft began to explode, but, despite the great danger, Sgt. Hosford returned to the blazing wreckage for the wireless operator, who was lying seriously injured close to it, and dragged him to a vehicle near by. The vehicle was badly damaged, and, although Sgt. Hosford had not driven before, he succeeded in driving the vehicle away from the danger area. During the whole of this time enemy aircraft were overhead bombing and machine gunning the blazing aircraft. Afterwards, to enable our bombers to land when returning from operations, Sgt. Hosford helped to re-lay a flare path, which he manned for the rest of the night. He displayed courage and devotion to duty of a very high standard, and undoubtedly saved two lives.

B.E.M. (MIL.).

Flt. Sgt. B. COUCHMAN, No. 156 Sqn.—One night in September, 1942, Flt. Sgt. Couchman was the navigator of an aircraft detailed to attack a target in the Ruhr. During the attack the aircraft was intercepted by an enemy aircraft and sustained damage which rendered it impossible to release the flares. On arrival back at base the captain accomplished a successful emergency landing, but unfortunately some of the flares ignited. Ammunition began to explode, and the aircraft was set alight and was in great danger of being blown up. Displaying complete disregard for his own safety, Flt. Sgt. Couchman remained in the aircraft and assisted three members of the crew to safety, two of whom were injured. In so doing he was twice thrown on to the flames, when the floor collapsed, sustaining severe burns. It was largely due to his courage and devotion to duty that his comrades were able to leave the aircraft safely.

Flt. Sgt. P. W. HEWITT, No. 204 Sqn.—In June, 1942, Flt. Sgt. Hewitt was the second pilot of a flying boat which crashed whilst alighting in a heavy swell, and sank. The crew were in shark-infested waters, 180 miles from land, with one rubber dinghy and four life belts. The captain of the aircraft was injured, and the dinghy would support only two people. Flt. Sgt. Hewitt, finding that one of the crew was drowning, managed to get him on to the damaged dinghy and spent the whole of one night swimming alongside, holding the man's head out of the water, until he died. Even then Flt. Sgt. Hewitt made strenuous efforts to effect resuscitations, to his own detriment and exhaustion. Later, when dinghies with food and water were dropped by an aircraft, Flt. Sgt. Hewitt was the first to swim out to collect those within range. The crew were on the water for seventy hours before they were rescued, and it was largely due to the magnificent example of self-sacrifice and endurance of Flt. Sgt. Hewitt and his cheerfulness in spite of the apparently hopeless situation that only one or the crew was lost. When rescued he was in a far worse physical condition than his companions.

Boys of No. 85 Squadron A.T.C. (Southgate) garaging a glider they have built. It was designed by F/O. J. R. Ford, who was a civilian pilot before the war.

Air Comdre. A. de T. Nevill, C.B.E., who has arrived to take over the H.Q. of the Royal New Zealand Air Force in England.

Roll of Honour

Casualty Communiqué No 193.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Royal Air Force

KILLED IN ACTION.—Sgt. R. A. Blake; Sgt. D. J. Bowden; Sgt. K. S. Chalmers; Sgt. E. E. C. Holmes; F/O. A. I. Lindsay; Sgt. J. C. McPherson; P/O. F. K. Randall; Sgt. R. H. Saunders; Sgt. S. F. Taylor; P/O. F. H. Walkinshaw.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. R. Harris; P/O. M. F. Hughes; Sgt. D. L. Overton, D.F.M.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. L. T. Manser; Sgt. E. Young.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. W. S. Bowen; F/O. D. D. I. Chapman; Flt. Lt. F. T. Collins; Sgt. A. Corpe; Sgt. R. O. Rose; Flt. Sgt. A. S. Spires, D.F.M.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. W. T. Macdonald.

MISSING.—Sgt. F. G. Allen; Sgt. A. Anderson; Sgt. E. W. Baldwin; Sgt. R. J. Benn; Sgt. J. Beveridge; Sgt. J. H. Bryan; Sgt. D. Buchanan; Sgt. G. J. Chambers; Sgt. H. R. Clark; Sgt. R. A. Cunningham; Sgt. A. Dabbs; P/O. E. J. Dando; Flt. Sgt. L. W. Deeth; Sgt. R. S. Fielding; Sgt. N. S. Forsythe; Sgt. C. S. George; Sgt. A. A. Gillies; Sgt. T. H. Grain; Sgt. J. Gray; P/O. D. F. Greaves; Sgt. M. Hanna; Sgt. H. Hardy; P/O. J. D. Hayes; W/O. F. E. M. Hicks; F/O. D. Higson; Act. Sqn. Ldr. A. E. Hill, D.S.O., D.F.C.; P/O. W. D. Hollis; Sgt. G. S. Hughes; Sgt. D. Jackson; Sgt. P. M. Jones; Act. Flt. Lt. R. O. Jones; Sgt. J. V. Kerr; P/O. K. W. Leakey; Sgt. G. McD. Mackinnon; Sgt. L. A. Marchant; Sgt. A. E. Messer; Sgt. R. Miller; Sgt. C. G. Parr; Flt. Sgt. N. G. E. Perrett; Sgt. E. T. Port; P/O. T. Proctor; Flt. Lt. H. Rhoden; Sgt. W. Simpson; Sgt. C. R. Stoward; Sgt. H. Taylor; Sgt. R. C. Taylor; Sgt. J. R. N. Thorpe; Sgt. G. T. Vuilleumier; Sgt. E. Walton; Sgt. A. T. S. Williamson; Sgt. W. R. Wilson; Sgt. H. J. Woollatt.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—P/O. T. Adamson.

KILLED ON ACTIVE SERVICE.—Sgt. A. H. Akester; L.A/C. F. E. Barnett; Cpl. R. Benson; Sgt. E. H. Boreham; Flt. Lt. F. Copsey; Sgt. A. Davies; Sgt. R. R. Davies; A/C.2 S. Dobell; Sgt. E. L. Eaves; P/O. C. E. Franklin; L.A/C. J. B. Garner; Cpl. G. A. Grant; P/O. R. Harrison, P/O. C. St. L. Hawkes; A/C.1 D. W. Hodges; F/O. R. D. Horner; Sgt. L. H. Horton; P/O. K. J. Howson; Col. A. W. Knights; Sgt. C. Lunny; Sgt. G. R. Macbryde; P/O. P. J. E. Mason; Sgt. D. T. E. Massey; Sgt. A. N. Melling; Sgt. J. G. Millinger; Sgt. A. W. Mills; Sgt. R. Phelan; Sgt. R. L. Philbey; Sgt. J. L. Rayner; Act. Flt. Lt. C. F. C. Ridout; Sgt. N. E. A. Ross; Act. Flt. Lt. L. V. Sanders; L.A/C. P. E. Sayer; P/O. P. F. Smith; Act. Wing Cdr. J. P. S. Smyth, D.F.C.; Act. Flt. Lt. D. M. J. M. Spencer; Sgt. D. Tanner; Sgt. H. O. Thomas; P/O. J. C. O. Trench, P/O. D. M. Walker; L.A/C. D. M. Watson; L.A/C. J. A. Woods; Sgt. H. L. K. Wright.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. J. Alexander; Sgt. H. A. Camp; Sgt. H. Clark; Sgt. D. N. H. Cocks; L.A/C. F. L. Donaldson; Cpl. J. T. Elliott; A/C.1 H. Hamilton; Sgt. W. Hill; Sgt. B. P. Jones; L.A/C. A. R. C. Mitchell; A/C.1 H. V. Mussard; L.A/C. F. Roberts; L.A/C. A. Schwatz; Sgt. P. H. Smith; A/C.1 F. W. Stockton; L.A/C. J. J. Watts; L.A/C. L. Wilkinson.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—A/C.2 R. E. Carter; P/O. P. R. C. Mars; Flt. Lt. H. F. G. Wood.

DIED ON ACTIVE SERVICE.—F/O. W. G. Bradshaw; L.A/C. G. S. Charleson; A/C.1 P. S. Chilton; A/C.2 O. Edwards; L.A/C. R. C. Frewin; L.A/C. E. Green; L.A/C. F. Hart; A/C.2 S. J. Grimes; Cpl. J. T. Hayes; A/C.1 A. Jeremiah; A/C.2 A. Johnson; A/C.1 C. W. Keeling; A/C.1 W. J. Lanham; A/C.2 R. Leslie; A/C.2 R. McAndrew; A/C.1 J. Marshall; L.A/C. S. G. Martyn; A/C.1 E. J. Mole; A/C.1 G. E. Parkes; A/C.1 W. J. Parkes; Cpl. J. M. C. Pemberton-Pigott; A/C.2 R. Penkethman; A/C.1 D. Pullar; A/C.2 R. A. T. Pyle; Act. Flt. Lt. B. J. A. Rennie, M.C.; Cpl. F. Stafford; L.A/C. W. J. Thomas; A/C.2 J. S. F. Thomson; L.A/C. W. A. Wood; L.A/C. A. Worsley.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.2 G. Caddick; A/CW.1 C. E. Evans; A/CW.2 G. Godkin.

Royal Australian Air Force

MISSING.—P/O. A. H. S. Brown; Sgt. H. A. Dalzell; Sgt. R. D. Gannon; Sgt. H. A. Martin; P/O. G. A. Neill; Sgt. J. L. Smith; Sgt. T. G. Wood.

KILLED ON ACTIVE SERVICE.—P/O. L. Forrester; P/O. R. A. Harper; Sgt. H. C. Lambert; Sgt. H. McK. Middleton; P/O. D. M. Murphy; Sgt. H. T. Nation; P/O. R. W. Wood.

Royal Canadian Air Force

KILLED IN ACTION.—Sgt. L. J. Barnard; Flt. Sgt. W. F. Bauer; Sgt. J. P. Bedard; Flt. Sgt. J. P. A. Boyer; Sgt. A. E. Prendergast; Sgt. J. M. Seguin; Sgt. J. L. R. Simoneau; Sgt. A. A. Siwak; Sgt. T. W. Yapp.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sqn. Ldr. W. A. Anderson.

WOUNDED OR INJURED IN ACTION.—Sgt. D. K. Wilson.

DIED OF WOUNDS RECEIVED IN ACTION.—Sgt. J. P. Standfast.

MISSING, BELIEVED KILLED IN ACTION.—P/O. J. I. Davidson.

MISSING.—F/O. J. E. Avise; P/O. G. R. Bing; P/O. F. W. Buck; Sgt. E. W. Chessor; P/O. R. J. Elliott; Flt. Sgt. J. A. Hutchinson; Sgt. J. M. Joynt; Flt. Sgt. G. A. Keil; Sgt. T. E. Oliver; Sgt. W. S. Rausch; Sgt. D. B. Smyth; Flt. Sgt. R. T. Taylor; P/O. D. F. Teague; P/O. W. H. Thomas; Flt. Sgt. L. E. White; Flt. Sgt. M. Zumar.

KILLED ON ACTIVE SERVICE.—Sgt. J. E. Des Jardins; P/O. R. T. Hempstead; Sgt. E. P. Hunt; Flt. Sgt. V. S. Irwin; Sgt. J. N. Maciver; P/O. J. Morris; Flt. Sgt. W. H. Plant, Sgt. W. R. C. Sinclair.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. G. Smith.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. H. J. Bell; Sgt. J. M. Broughton; Sgt. R. S. Clinton.

DIED ON ACTIVE SERVICE.—L.A/C. G. A. Harper.

Royal New Zealand Air Force

KILLED IN ACTION.—Sgt. D. B. Clark; Sgt. R. R. Todd.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. J. W. Black.

WOUNDED OR INJURED IN ACTION.—Sgt. L. P. Garvey.

MISSING.—Sgt. L. D. Clark; Sgt. D. H. Gordon; W/O. D. M. Keane.

KILLED ON ACTIVE SERVICE.—Sgt. R. J. Fuller; Sgt. V. X. Kirby, Sgt. J. L. Lloyd; Sgt. E. A. McCord; Sgt. E. Neve; P/O. W. E. Nilsson; Sgt. B. J. O'Connor; Sgt. I. R. Styles.

South African Air Force

KILLED IN ACTION.—Lt. J. de La H. Lane; Lt. A. Erasmus; Lt. P. H. Jackson.

WOUNDED OR INJURED IN ACTION.—Air Sgt. Dyson; Lt. J. W. Johnson; Air Sgt. P. Verster.

MISSING.—Lt. S. V. Coleman; Air Sgt. E. S. Vandderyerwe; Flt. Sgt. J. Van Loggerenberg.

KILLED ON ACTIVE SERVICE.—2/Lt. W. F. Steenkamp.

Indian Air Force

DIED ON ACTIVE SERVICE.—A/C.2 D. N. Gohain.

Casualty Communique No. 194.

Royal Air Force

KILLED IN ACTION.—Wing Cdr. S. B. Bintley, A.F.C.; F/O. K. R. Gardener; P/O. R. E. Gurd; P/O. W. W. G. Smith; P/O. R. W. Yuill.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. R. E. Bush; Sgt. P. C. Morris; Sgt. J. Potts; Sgt. T. Robson Scott; Flt. Sgt. G. Sanderson; Sgt. G. A. Simpson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. W. H. Bowers; Sgt. W. L. Cooke; Sgt. E. M. C. Fahmy; Sgt. H. O. Hadley; Act. Flt. Lt. J. B. Hebbs; Sgt. R. J. T. Lovell; Act. Sqn. Ldr. A. Mathieson; Sgt. P. F. Monk; Sgt. D. W. Peacey; Sgt. R. Rowley; Flt. Sgt. R. D. C. Tomlinson; Flt. Sgt. E. G. H. Watts; P/O. T. W. W. Woodford.

WOUNDED OR INJURED IN ACTION.—Sgt. H. Green; P/O. W. D. Litster; Flt. Sgt. H. A. Ward; Sgt. R. White.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. J. Glendenning; Sgt. F. Greaves; Sgt. J. P. R. Julian; Sqn. Ldr. J. C. Simpson; P/O. J. H. Thwaits; Flt. Lt. C. B. Walter.

MISSING.—Sgt. E. Adey; Sgt. C. N. Anderson; P/O. W. Bain; Sgt. F. Barker; Flt. Sgt. C. L. Barringer; Sgt. L. H. Bell; Sgt. W. Bell; W/O. O. R. Bowerman; Sgt. B. J. W. Boyle; F/O. N. S. Brady; Sgt. W. G. Brown; Sgt. G. A. Bushnell; P/O. S. C. W. Carlson; Sgt. S. A. Claridge; Sgt. J. Coltman; Sqn. Ldr. W. D. Corr, D.F.C.; P/O. E. T. Daintith; Sgt. R. J. Delve; Flt. Sgt. W. G. Drayton; Sgt. O. G. Edwards; Sgt. R. A. Ellis; Sgt. J. Entwistle; Sgt. J. St. B. Fern; P/O. D. F. Fitzgerald; Sgt. L. W. Giles; Sgt. S. V. Goodhew; Sgt. F. R. Guppy; Sgt. G. Hancock; Sgt. R. Harris; P/O. A. A. Harvey; Sgt. A. F. Hellbrnan; P/O. J. B. Lawrence; Sgt. E. Lees; Sgt. S. R. Lord; Sgt. K. W. McAuliffe; P/O. M. J. McCann; Sgt. C. S. McIlenry; Sgt. J. G. Meredith; Sgt. H. A. Merrony; P/O. J. T. M. Miles; Sgt. J. Milner; Sgt. R. H. Meade; Sgt. L. Newbold; Sgt. G. W. Newman; Sgt. H. P. Norcross; Flt. Sgt. C. E. Ody; Sgt. E. J. Pete; Flt. Sgt. D. K. Potter; Sgt. A. Quinn; P/O. R. Rawlings, D.F.C.; Flt. Sgt. S. D. G. Roberts; Sgt W. Scott; Sgt. A. M. Smith; Sgt. H. B. Smith; Sgt. B. D. Swain; Sgt. A. R. Taylor; Sgt. J. C. Taylor; Sgt. J. W. Tyson; Sgt. S. J. Vincent; P/O. E. A. Wagstaff; Sgt. W. J. Wakelin; Sgt. R. H. Walker; Sgt. J. Watkins; Sgt. K. H. Whitmore; Sgt. J. H. Wilcox; Sgt. E. Wilde; Sgt. J. A. D. Wildish; Sgt. K. A. Wilkins; P/O. E. D. Williams; Flt. Sgt. G. J. A. Willis; P/O. D. G. Wilmer; F/O. N. S. Wilson; Sgt. W. G. Woodhouse; Sqn. Ldr. C. M. Wright; Flt. Sgt. L. R. T. Wright; Sgt. J. H. Young; Sgt. P. A. Young.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—P/O. J. L. G. Campbell; Sgt. D. A. Saunders; Sgt. T. G. Sinnett.

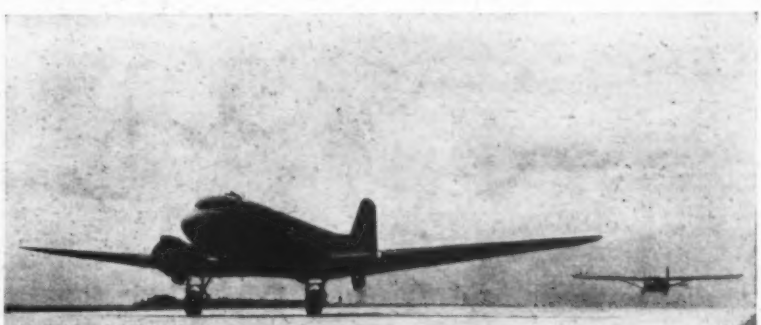
KILLED ON ACTIVE SERVICE.—Sgt. D. D. Audley; Flt. Sgt. L. J. Bailey; Sgt. J. H. Barnett; Sgt. C. S. Barrie; Sgt. A. Beswick; Sgt. A. Bird; A/C.2 A. R. Bullen; Cpl. D. S. Cleaver; Sgt. G. W. Day; L.A/C. H. J. J. Day; Sqn. Ldr. C. G. Fisher; L.A/C. A. S. Gadd; Sgt. M. S. Gilbert; P/O. W. J. Hay; Sgt. P. D. Head; A/C.2 J. R. Holmes; A/C.2 N. J. Humphreys; L.A/C. P. J. Isidore; Sgt. J. Ling; Sgt. A. R. McIntosh; A/C.2 N. Maina; Sgt. A. E. Mason; A/C.2 R. Mason; Sqn. Ldr. S. J. Monroe, D.F.C.; Sgt. E. O. Oddy; Sgt. R. G. Ponting; A/C.2 J. O. Prince; L.A/C. R. W. Sampson; Act. Flt. Lt. B. H. Salter; P/O. T. R. Scott; P/O. J. M. Townsend; L.A/C. T. Travers; L.A/C. A. W. G. Walker; Sgt. R. Walker; P/O. G. M. Weymouth; Sgt. H. Whittaker; L.A/C. W. V. G. Wigmore; P/O. D. B. Williams; Flt. Lt. H. Williams; Act. Flt. Sgt. J. E. Williams, D.F.M.; Sgt. A. Wilson; Sgt. A. M. Wood.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. I. S. Woolf.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.1 J. G. Bone; P/O. R. V. Garton; A/C.2 W. G. Gyles; Sgt. H. Kenny; L.A/C. J. McKeown; Cpl. W. Nelson; A/C.2 D. F. Peters; A/C.2 D. C. Rogers; A/C.2 B. F. Stephenson; A/C.2 F. J. Stevenson; L.A/C. J. Taylor; A/C.1 W. H. West; Sgt. A. H. Whitted.

DIED OF WOUNDS OR INJURIES RECEIVED ON

SERVICE AVIATION



A Douglas C-47 (D.C.3) making a tow-take-off with a Ford-built 15-seater glider.

SERVICE AVIATION

ACTIVE SERVICE.—Flt. Lt. F. J. L. Daus; P/O. A. R. Frost; Sgt. C. Markiew.

DIED ON ACTIVE SERVICE.—Cpl. H. G. Baggs; A/C.2 E. B. Bedford; A/C.1 R. Bell; A/C.2 J. B. Fordyce; L.A/C. C. F. Johnson; L.A/C. C. R. Weight; A/C.1 W. E. Young.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. C. F. Woodburn; Sgt. R. O. Bryant; Sgt. H. E. Rowley; P/O. H. N. Young.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. R. L. Cumberland; Sgt. J. T. Philpot.

MISSING.—Sgt. A. G. Declerck; Sgt. G. G. Fraser; Sgt. S. A. Gregg; Sgt. L. R. Sherwood; Sgt. R. W. Taylor.

KILLED ON ACTIVE SERVICE.—Sgt. J. L. Goulter; Sgt. R. B. Stoddart.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Act. Flt. Lt. H. K. Keck.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. E. Waters.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. W. B. Croft; Sgt. H. J. T. Gray; P/O. W. J. Jones; P/O. A. McB. Wardrop.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. R. H. McKillop.

WOUNDED OR INJURED IN ACTION.—Sgt. P. V. Lamont.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—F/O. A. J. Graham.

MISSING.—P/O. R. A. Bendwig; Sgt. W. C. Colwill; Sgt. J. D. Cooper; Sgt. H. G. N. Fisher; Sgt. R. E. Flavelle; F/O. W. C. Hamilton; P/O. M. M. Liebeck; Sgt. J. F. MacCallum; Sgt. J. R. MacKinnon; F/O. H. F. Marting; Flt. Sgt. J. Molesworth; Sgt. W. J. Mollard; Sgt. J. R. Moore; Sgt. W. M. Murphy; Sgt. A. H. Pepper; Sgt. D. S. Rathe; Sgt. A. R. Swain; W/O. E. K. Tomlinson; P/O. F. E. Wickstrom; Sgt. H. G. Wilson; P/O. R. G. Winder.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. M. H. Hargreaves.

KILLED ON ACTIVE SERVICE.—P/O. H. F. L. Longworth; Sgt. E. A. Recchia.

WOUNDED OR INJURED ON ACTIVE SERVICE.—W/O. F. T. Hubbard; Sgt. M. H. Sims.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—P/O. A. F. Koehn.

Royal New Zealand Air Force

WOUNDED OR INJURED IN ACTION.—Sgt. S. L. Pointon.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. R. W. Urwin.

MISSING.—P/O. J. S. S. Adams; Sgt. V. A. O. Dimock; Sgt. H. J. Hugill; Sgt. A. J. V. Hunt; Sgt. D. H. Judd; Sgt. J. A. McConnell; Sgt. L. H. Martin; P/O. R. L. Meredith; Sgt. N. M. Park; Sgt. S. C. Smith; Sgt. D. N. Tonkin; P/O. J. C. Webster; Sgt. E. Worsdale.

KILLED ON ACTIVE SERVICE.—P/O. W. I. Charteris; Sgt. F. S. Dean; Sgt. W. H. Hood; P/O. A. W. McLean; Sgt. E. H. Turner.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—P/O. J. H. Bomford.

South African Air Force

KILLED IN ACTION.—Lt. P. H. Bingham; Lt. T. C. M. Browning.

WOUNDED OR INJURED IN ACTION.—Air Sgt. A. H. Hartley; 2/Lt. R. W. Humphrey; Air Sgt. J. Woodliffe.

MISSING, BELIEVED KILLED IN ACTION.—Lt. H. H. Roberts.

Indian Air Force

MISSING, BELIEVED KILLED IN ACTION.—P/O. S. K. Ray.

DIED ON ACTIVE SERVICE.—A. Singh.

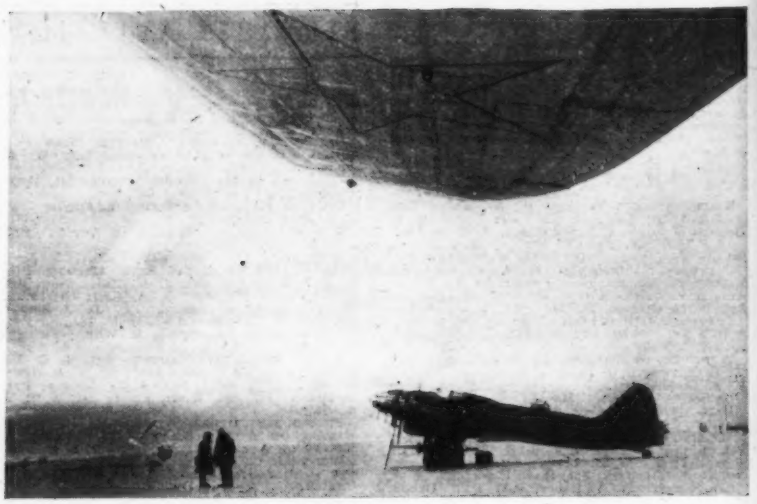
Casualty Communiqué No. 195.

Royal Air Force

KILLED IN ACTION.—Act. Flt. Lt. D. D. Bonnett, D.F.C.; P/O. W. A. Cruichshanks; Sgt. W. J. Ferris; Sgt. W. G. Fraser; Sgt. B. Grieve; Sgt. E. S. W. Hatch; Sgt. A. V. Howarth; Sgt. A. Mahoney; P/O. W. B. Martin; Sgt. L. Nockels; Sgt. G. C. Roper; F/O. G. M. Sellar; Sgt. N. H. Simms; P/O. J. M. Sinclair; Sgt. F. Swainson; Sgt. R. J. Wallis; Sgt. J. A. Williamson; P/O. R. A. Wright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. J. A. Barclay; P/O. F. W. Belton; Sgt. W. MacD. Crane; Sgt. G. W. Hough; Act. F/O. G. Maclagan; Sgt. B. L. Nesbitt; Sgt. R. D. Olver.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. G. R. Bayley; Sgt. L. J. Dunn; Sgt. F. Fishwick; Sgt. A. Fulton; Sgt. A. G. Harris; Flt. Sgt. J. E. Jones, D.F.M.; Flt. Lt. W. J. W. Kingston; F/O. R. H. Powell; Sgt. W. A. Roberts.



Twin-engined DB-3F bombers on an advanced Russian airfield.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. L. R. Sims.

WOUNDED OR INJURED IN ACTION.—Sgt. F. V. Collins; Sgt. L. Hogan; Sgt. R. Levy; Sgt. D. T. Pass; P/O. R. H. Payne; Sgt. W. B. Weir.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. E. Brookes; Sgt. H. O. Dawe; Sgt. G. C. Mackenzie.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. T. W. Balmforth; Sgt. H. J. Brook; Sgt. J. G. Cocks; Sgt. A. J. N. Edwards; Sgt. R. G. J. Hillyer; P/O. T. H. H. Jones; P/O. J. S. Lee; Sgt. S. W. Nash; Sgt. F. R. Pickering; Sgt. S. R. M. Pugh; Sgt. E. L. Simon; Sgt. R. Tebbutt; P/O. W. A. Tolmie; P/O. J. Towner.

MISSING.—Flt. Lt. A. J. Andrews, D.F.C.; Flt. Sgt. J. H. Austin; Sgt. J. R. Bertram; Sgt. E. Bradley; Sgt. B. J. Bradsell; Sgt. L. S. Bridges; Sgt. A. C. Burne; Sgt. J. H. Campbell; P/O. H. P. Collings; F/O. P. N. Dobie; Sgt. W. G. Dryburgh; Flt. Sgt. H. V. Ellerker; Flt. Sgt. R. A. Francis; P/O. G. O. Gardner; Flt. Sgt. J. A. Gibbons; F/O. R. G. V. Gibbs; Sgt. M. V. Grant; Sgt. H. M. Grey; Sgt. P. E. Harwood; Sgt. F. Hendron; Sgt. W. E. Hornby; P/O. G. Hoskins; Sgt. F. B. Hough; Sgt. J. Howells; Sgt. R. V. Howes; P/O. D. K. Hulme; Sgt. E. T. W. Lampitt; Flt. Lt. R. S. Lawrence; Act. Sqn. Ldr. R. M. Lloyd, D.F.C.; Sgt. A. C. Loeber; Sgt. J. McPherson; F/O. J. Marriner; Sgt. D. Noble; Sgt. L. C. Norman; Sgt. J. R. Ovens; Sqn. Ldr. C. D. Palmer, D.F.C.; Sgt. H. Pollitt; Sgt. N. C. Reinelt; L.A/C. W. L. Riley; Sgt. E. C. Ringham; Sgt. A. R. Rudd; Flt. Sgt. H. H. Sawyer; Sgt. J. R. Stocker; L.A/C. S. S. Suriyapillai; Sgt. J. A. Taylor; Sgt. P. Y. Thomson; Sgt. G. Viles; Sgt. E. Watcham; Sgt. W. H. Watkins; Act. Wing Cdr. J. M. White; Sgt. L. C. Willey; Sgt. C. H. Willmot; Sgt. E. C. Woollard; Sgt. F. Wright; F/O. S. W. Young.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. J. Orrell; Sgt. H. J. Thorn.

KILLED ON ACTIVE SERVICE.—F/O. J. W. Allison; Act. Sqn. Ldr. C. T. Ashton; Sgt. D. M. Belgrove; Sgt. S. E. Blackman; Sgt. W. H. Brazenall; P/O. R. Cook; Sgt. S. G. Cook; Sgt. A. P. Cunningham; Flt. Lt. P. M. Davis; Sqn. Ldr. J. F. A. Day, A.F.C.; Sgt. J. D. Forsyth; Sgt. W. J. Goodfellow; P/O. P. J. Graves; Sgt. T. M. G. Gray; F/O. J. E. F. Griffin; P/O. H. W. P. Hainey; P/O. D. R. Harding; P/O. D. S. Hegan; P/O. G. C. A. Holt; P/O. D. H. Hornby; Sgt. A. G. Hudd; Sgt. H. Josephs; Sgt. A. Keen; F/O. J. C. Lawton; Sgt. W. J. Morbin; W/O. W. L. Primrose; Sgt. A. W. Pryke; Sgt. W. L. Rhys; Sgt. R. R. Schwalghart; Flt. Lt. C. M. B. Symons; L.A/C. C. W. Thorp; Sgt. A. Weller; Sgt. J. H. Williams; Sgt. S. R. Williams; Sqn. Ldr. R. De W. K. Winlaw.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. A. Brannigan; Sgt. P. E. Godfrey; P/O. J. A. Hawkins; Sgt. A. H. Jeeves; Sgt. E. J. Taylor

DIED ON ACTIVE SERVICE.—Cpl. W. H. Amann; L.A/C. C. W. Anders; A/C.1 P. Baird; L.A/C. W. H. Conyers; Sgt. S. V. Elliott; Cpl. J. A. P. Gorsten; A/C.1 M. Lambert; A/C.1 R. G. Lathey; P/O. T. W. L. Miller, D.C.M.; F/O. W. P. Palmer; Sgt. M. S. Robinson; A/C.2 R. W. Shorthouse.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.1 E. G. M. Jackson.

Royal Australian Air Force

KILLED IN ACTION.—Sgt. R. D. Dangerfield, D.F.M.; Sgt. R. G. Lawrence; Sgt. W. H. I. Myers, D.F.M.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. R. K. Durridge; F/O. W. A. Thornton; Sgt. N. J. Weston.

WOUNDED OR INJURED IN ACTION.—Sgt. R. H. L. Charnley; Sgt. W. A. Colquhoun.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. W. Parks.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. L. G. Davis; Sgt. J. R. Furlong; P/O. W. Garriock; Sgt. S. B. Gitsham; Sgt. R. J. Hamilton.

MISSING.—Sgt. J. Churchill; P/O. W. A. Cranz; Sgt. D. A. Donaldson; F/O. D. G. W. Leake; Sgt. A. J. Richardson.

KILLED ON ACTIVE SERVICE.—P/O. M. E. Bridgland; Sgt. R. E. Broad; P/O. R. E. Holgate; Flt. Sgt. J. E. Mullard, F/O. E. L. Reis; Sgt. J. W. Storey; Sgt. F. G. Terry; Sgt. D. C. Williamson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. D. H. Dyson; Sgt. L. J. Martin.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. R. M. E. Iles.

Royal Canadian Air Force

KILLED IN ACTION.—Sgt. M. Charton; F/O. W. McN. Thompson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. J. Dillon; Flt. Sgt. L. G. Elliott; Sgt. J. E. McDonald.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. S. J. Beranek; P/O. W. F. Bond; P/O. E. P. Brinkworth; Flt. Sgt. C. S. Carruthers; P/O. W. A. Harris; Act. F/O. J. F. K. Sandys; P/O. L. N. Sarles.

MISSING, BELIEVED KILLED IN ACTION.—F/O. H. J. Davidson; Sgt. R. J. L. Fournier; Flt. Sgt. A. G. Mackay; Sgt. C. R. Patton; Sgt. F. J. Smith.

MISSING.—P/O. J. F. Osborn; P/O. L. H. Peterson; Sgt. G. T. Reyburn.

KILLED ON ACTIVE SERVICE.—P/O. B. W. Andrews; Sgt. D. C. Hawk; Sgt. R. H. Woolliams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. J. R. Gorham.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—Flt. Sgt. J. Beaupre.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. A. P. Collins.

Royal New Zealand Air Force

KILLED IN ACTION.—F/O. V. E. Crowther; Flt. Sgt. F. R. Higgot; Flt. Sgt. J. Pearse.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. H. L. Jackson; Flt. Sgt. R. J. B. Lindesay.

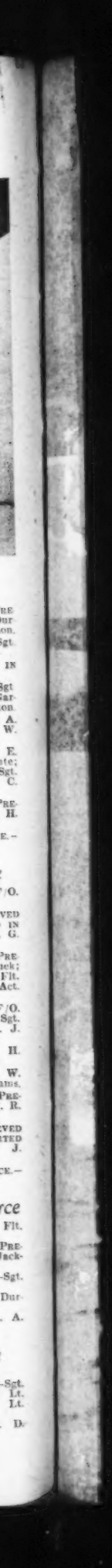
MISSING, BELIEVED KILLED IN ACTION.—Sgt. J. A. Fuller; P/O. R. W. Simpson.

MISSING.—F/O. E. C. Cox; P/O. C. R. Durrant; P/O. C. C. Reilly; P/O. L. V. Weir.

KILLED ON ACTIVE SERVICE.—P/O T. J. A. Long.

South African Air Force

KILLED IN ACTION.—Capt. T. Rhodes.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. H. G. Hilton-Barber; Lt. E. W. Hudson; Lt. E. W. L. Popham; Sgt. R. J. Stringer; Lt. J. G. H. Wilmot.

MISSING.—Lt. E. G. Dustow; Lt. M. T. D. Farr; Lt. H. C. Francis; Lt. A. B. Groch.